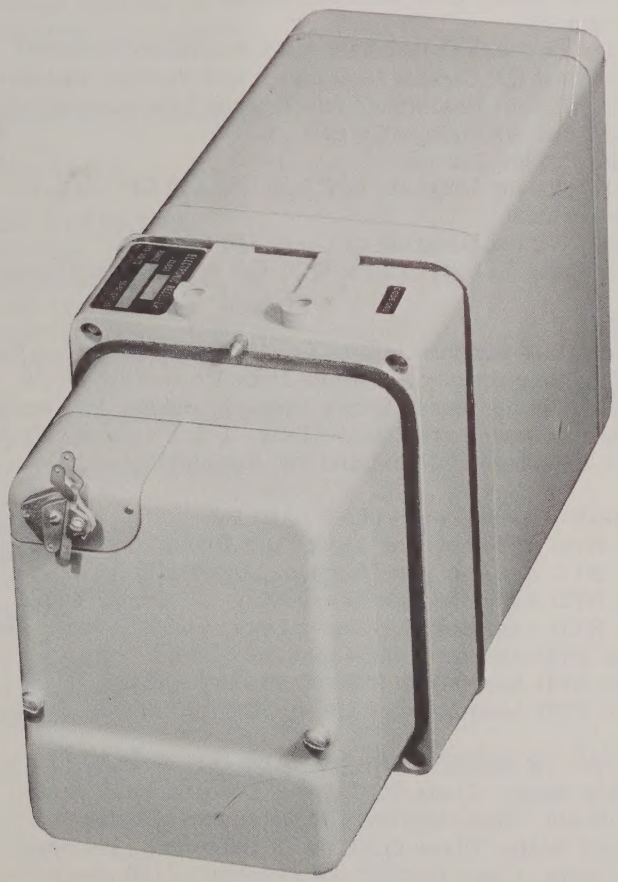
Bailey

SECTION
E51-4

PRODUCT INSTRUCTIONS

PYROTRON* RECEIVERS
CLASS QW, QN, AND QQ



*REG. U.S. PAT. OFF.

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FORM IE51-4-1167

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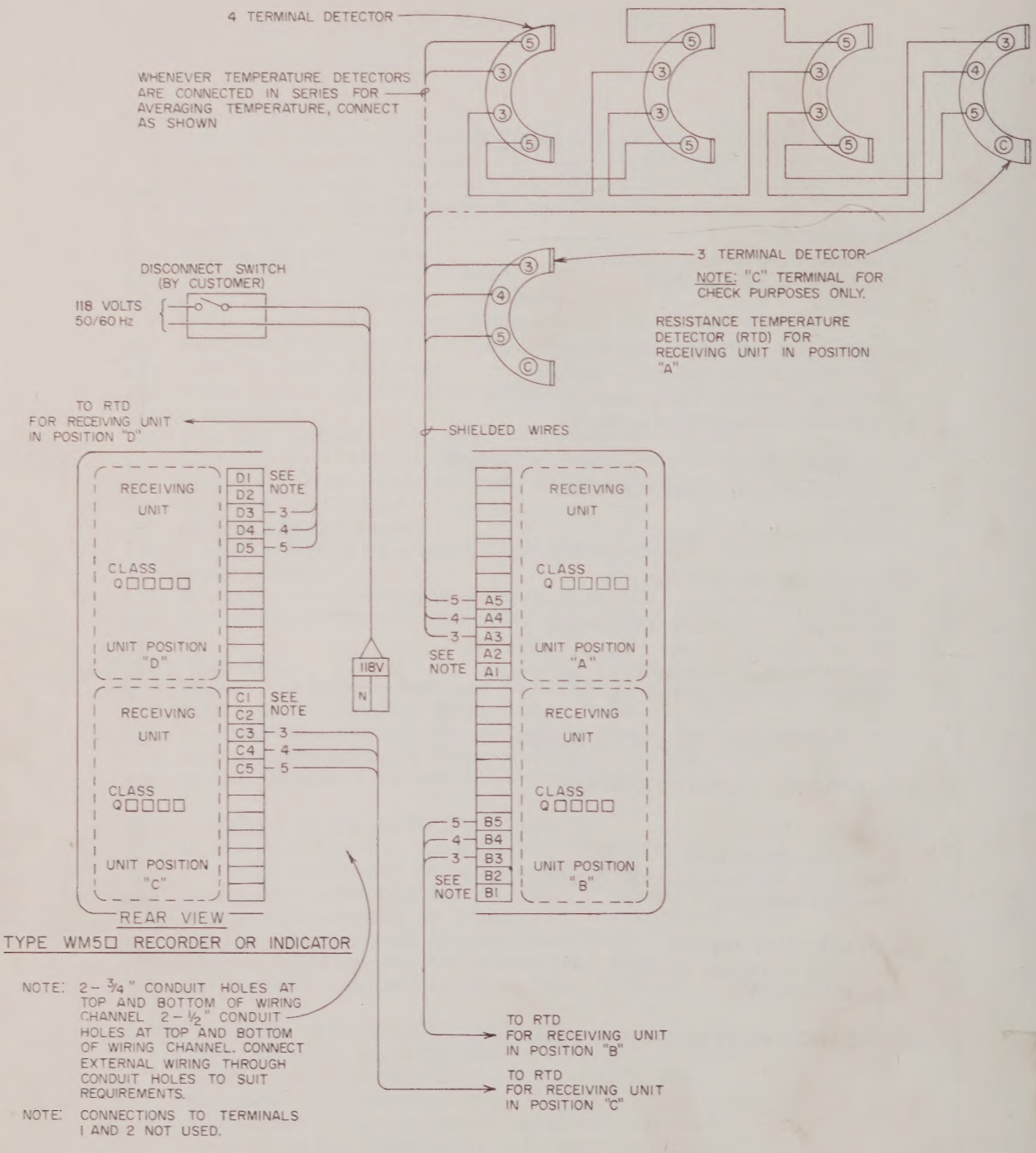


FIGURE 1 - External Connection Diagram for Class QW and QN Circuits with C Design (10 ohm) Detectors

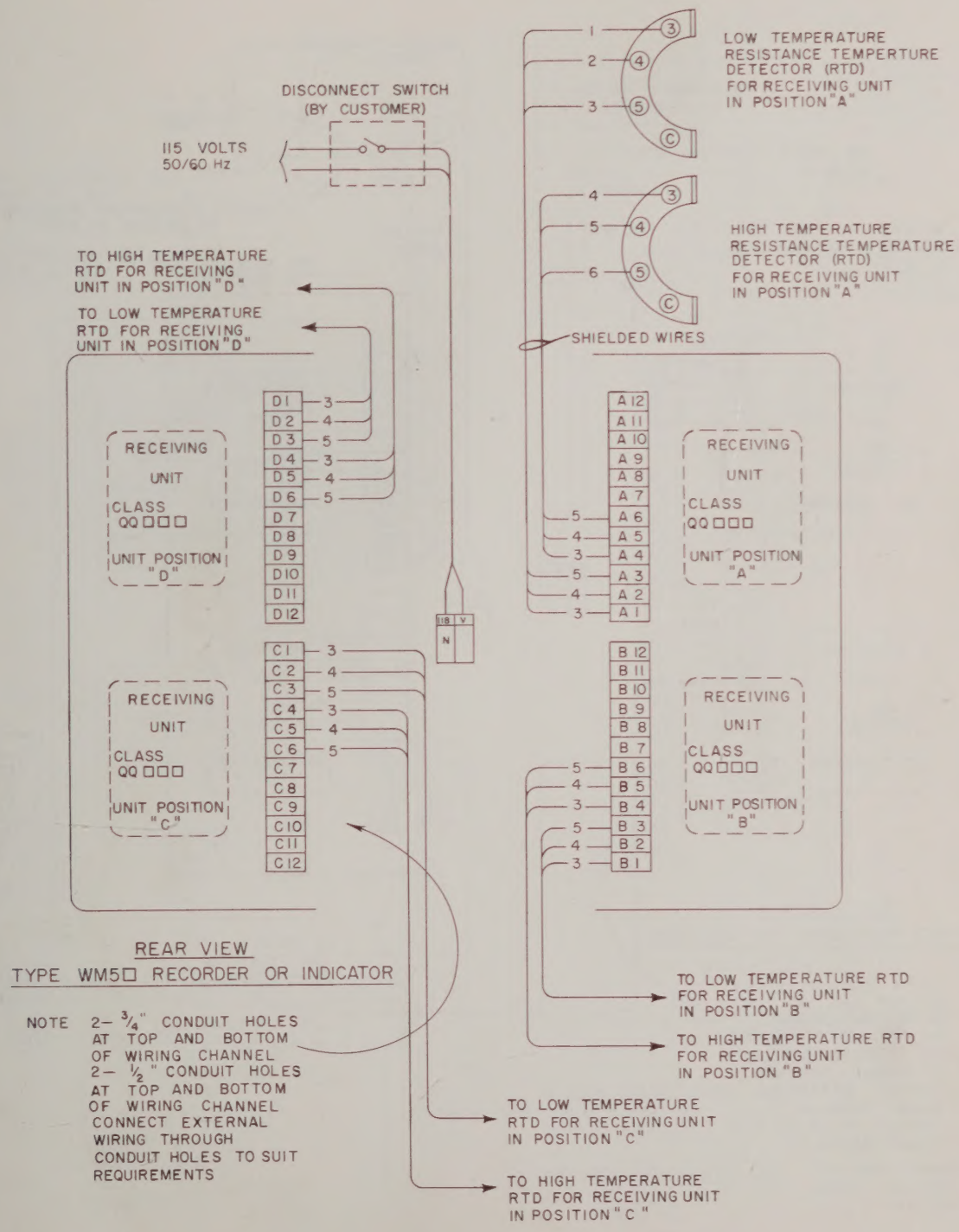

LOW TEMPERATURE RESISTANCE TEMPERTURE DETECTOR (RTD) FOR RECEIVING UNIT IN POSITION "A"
HIGH TEMPERATURE RESISTANCE TEMPERATURE DETECTOR (RTD) FOR RECEIVING UNIT IN POSITION "A"
SHIELDED WIRES
DISCONNECT SWITCH (BY CUSTOMER)
115 VOLTS 50/60 Hz
TO HIGH TEMPERATURE RTD FOR RECEIVING UNIT IN POSITION "D"
TO LOW TEMPERATURE RTD FOR RECEIVING UNIT IN POSITION "D"
RECEIVING UNIT CLASS QQ□□□ UNIT POSITION "D"
RECEIVING UNIT CLASS QQ□□□ UNIT POSITION "A"
RECEIVING UNIT CLASS QQ□□□ UNIT POSITION "C"
RECEIVING UNIT CLASS QQ□□□ UNIT POSITION "B"
REAR VIEW
TYPE WM5□ RECORDER OR INDICATOR
NOTE 2– ¾" CONDUIT HOLES AT TOP AND BOTTOM OF WIRING CHANNEL
2– ½" CONDUIT HOLES AT TOP AND BOTTOM OF WIRING CHANNEL
CONNECT EXTERNAL WIRING THROUGH CONDUIT HOLES TO SUIT REQUIREMENTS
TO LOW TEMPERATURE RTD FOR RECEIVING UNIT IN POSITION "B"
TO HIGH TEMPERATURE RTD FOR RECEIVING UNIT IN POSITION "B"
TO LOW TEMPERATURE RTD FOR RECEIVING UNIT IN POSITION "C"
TO HIGH TEMPERATURE RTD FOR RECEIVING UNIT IN POSITION "C"

FIGURE 2 - External Connection Diagram for Class QQ Circuits with C Design (10 ohm) Detectors

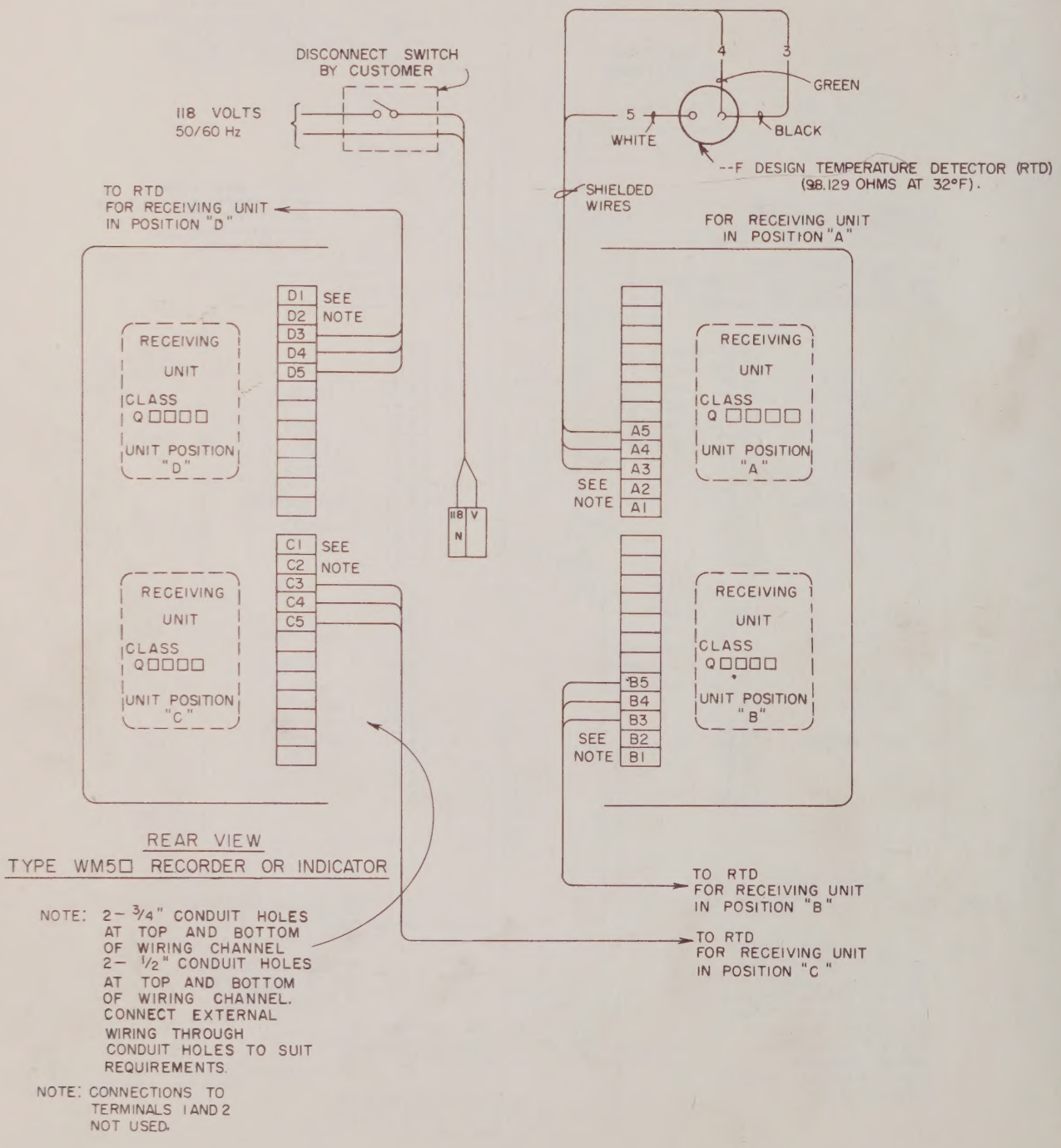


FIGURE 3 - External Connection Diagram for Class QW and QN Circuits with F Design, 100 ohm (98.129), Detectors

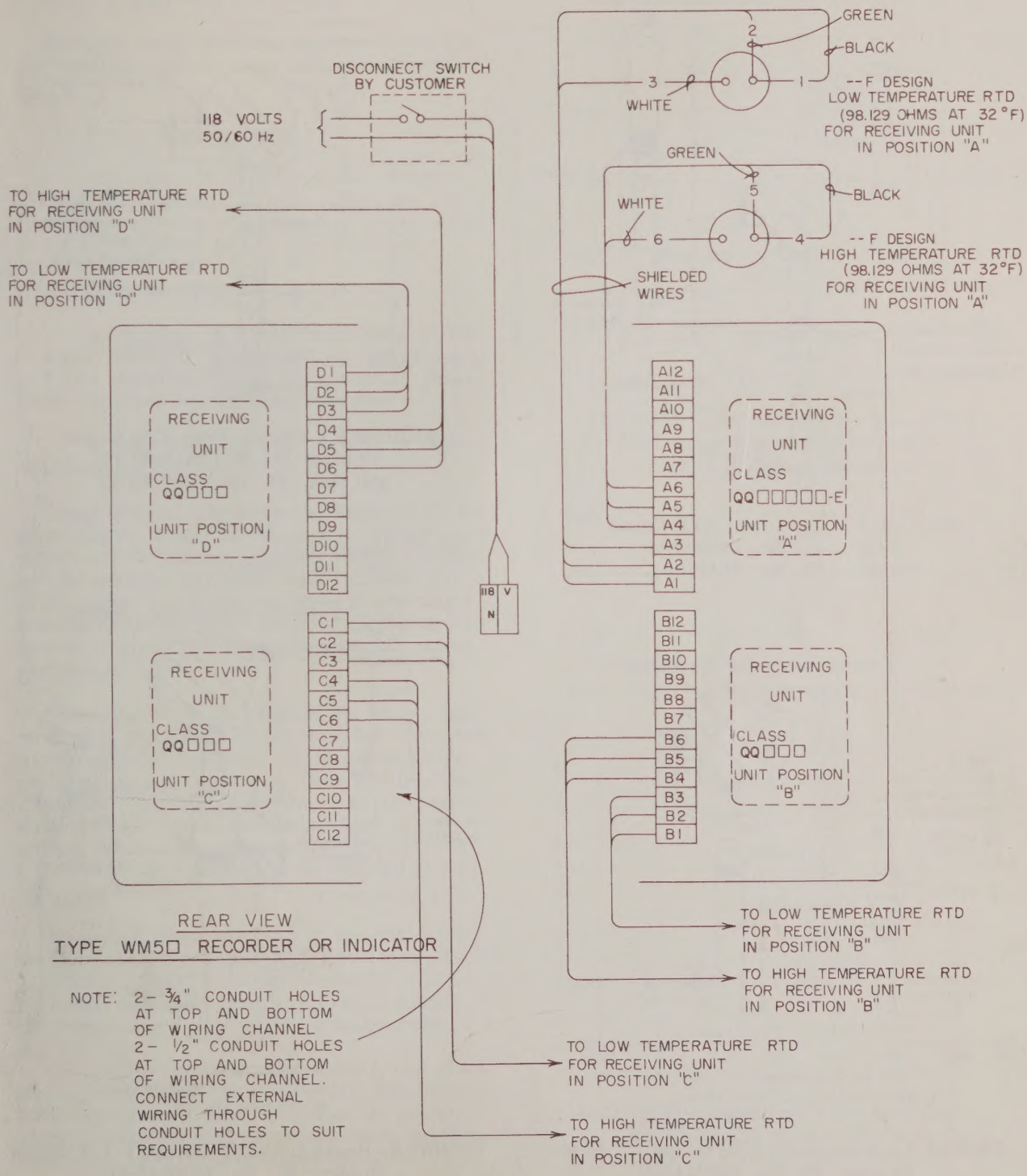


FIGURE 4 - External Connection Diagram for Class QQ Circuits with F Design, 100 ohm(98.129), Detectors

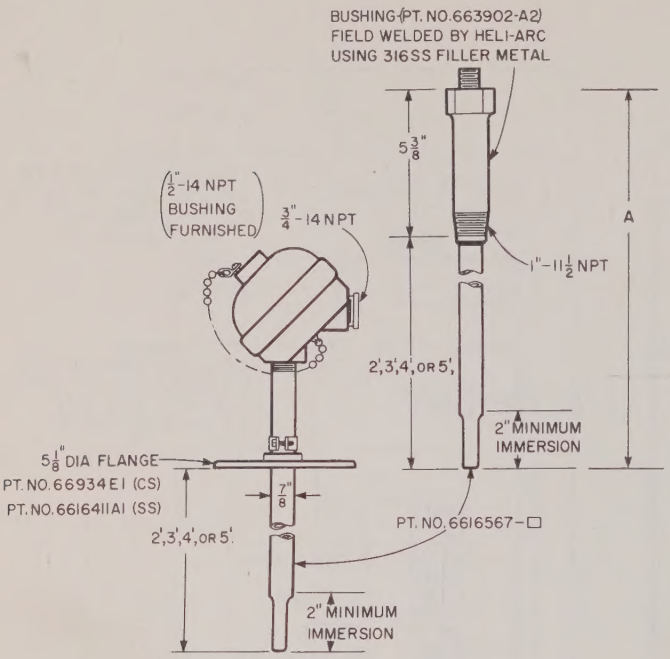


FIGURE 5 - Light Duty RTD Group
10 ohm, Pt. No. 669399-□
100 ohm, Pt. No. 6619999-□

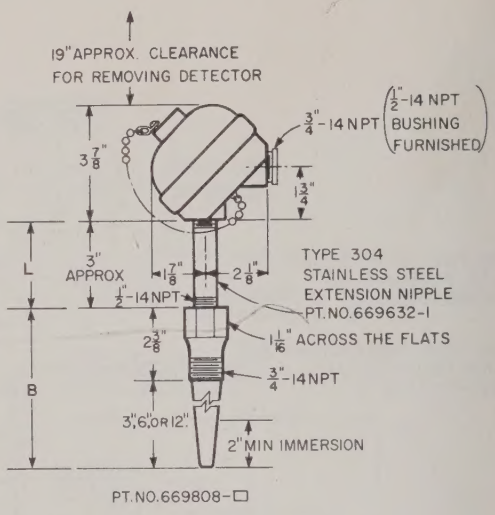


FIGURE 6 - Medium Duty RTD Group
10 ohm, Pt. No. 6610447-□
100 ohm, Pt. No. 6620569-□

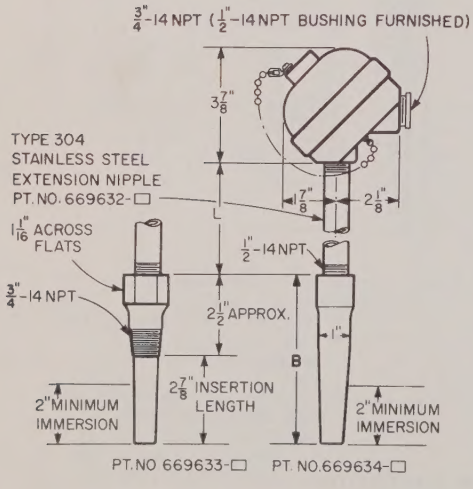


FIGURE 7 - Heavy Duty RTD Group, 1" Shank
10 ohm, Pt. No. 6610446-□
100 ohm, Pt. No. 6620568-□

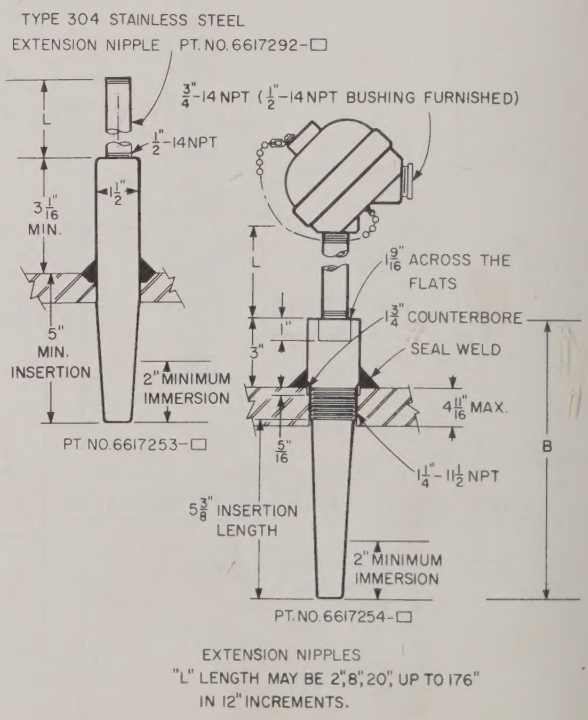


FIGURE 8 - Heavy Duty RTD Group, 1-1/2" Shank
10 ohm, Pt. No. 6620945-□

INSTALLATION

External Connections and Wiring

External connection diagrams for Class QW, QN, and QQ circuits are shown in Figures 1 thru 4.

1. Power Requirements

118 volts, 50 or 60Hz power supply: 107 volts minimum, 127 volts maximum. ±2Hz maximum variation in frequency. Power load: 13 VA at .88 power factor, per Receiver.

2. Connecting Wire Requirements

a. Number of Wires: Measuring circuit -- 3 per Receiver (Class QW and QN circuits) or 6 per Receiver (Class QQ circuits). Power Supply -- 2 per Recorder or Indicator.

b. Size and Maximum Length of Wires in Measuring Circuit:

Class QW and QN: Refer to Figure 9 or 10, depending on design of resistance temperature detector (RTD) being used. Intersection of length and temperature ordinates must fall below curve of wire size. The three leadwires connecting the resistance temperature detector (RTD) to the Receiver must be of same size for equal resistance.

Class QQ: Wire size should be No. 16 AWG or larger. Maximum length is 1,000 feet when wired according to these instructions. If a greater length is necessary, consult Bailey Meter Company. Maximum resistance per line should be limited to 4 ohms, and the six leadwires connecting the resistance temperature detectors (RTD) to the Receiver must be of same size for equal resistance.

To permit easy removal of the resistance temperature detector assembly, with both Class Q□□□□--C and --F design detectors, the installation of a short length of flexible conduit at the temperature detector is recommended.

c. For the measuring circuit, use wires with a low leakage, good dielectric insulation, such as polyvinyl chloride, Teflon or polyethylene. Insulation wall thickness must be suitable for at least 300 volt rated operation.

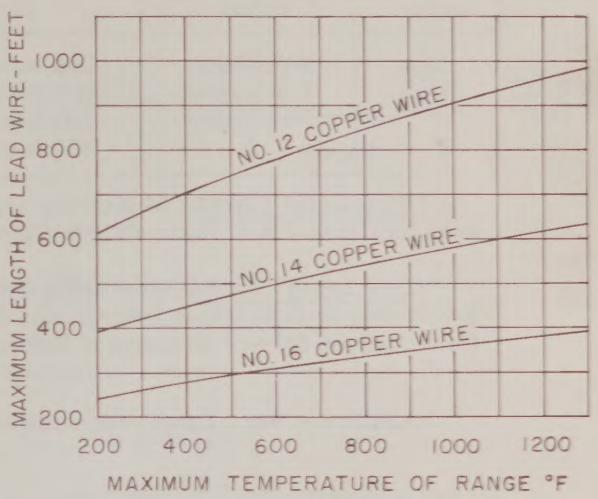


FIGURE 9 - Maximum Wire Size Curve for Class QW and QN Circuits with -- C Design Detectors

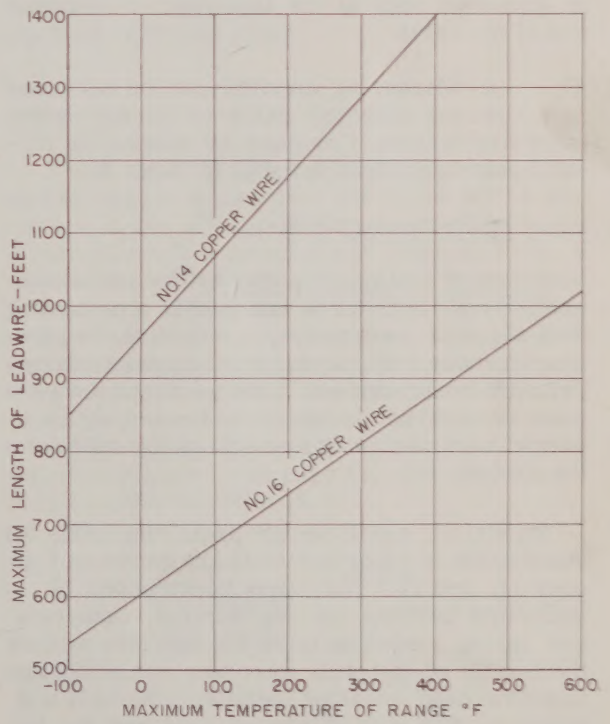


FIGURE 10 - Maximum Wire Size Curve for Class QW and QN Circuits with -- F Design Detectors

*High Level	**Low Level	Maximum Recommended Distance that Measuring Circuit Wires may be run in Common Cable
1	1 or more	200 feet
2	1 or more	100 feet
0	3 or more	300 feet
0	2	400 feet

Whenever low level measuring circuits are Class Q for range spans of 300F or greater, the maximum recommended distance may be doubled.

*High Level Circuit: Measuring circuit operating at potential of several volts, such as Class J A-C Ratio Bridge Circuit or Class B A-C Voltage Balance Circuit.

**Low Level Circuit: Measuring Circuit operating at potential in the order of millivolts, such as Class QW, QN and QQ A-C Wheatstone Bridge Circuits, Class G Gas Analysis Circuit or Class G Smoke Density or Particle Concentration Circuit.

TABLE A - Wire Length Recommendations for Multiple Measuring Circuits

d. Measuring circuit wires must be run in metallic shielded cable or conduit. If wiring is run adjacent to power or control wires carrying current in excess of 30 amperes, the shield must be of magnetic material. The shield must be grounded only at the Recorder or Indicator end of the cable.

e. Measuring circuits can be combined in a common shielded cable or conduit with other Bailey Meter Company AC measuring circuits per the distances listed in Table A.

Locating Protecting Well

C and F Design Detectors. The resistance temperature detector is inserted in a protecting well which is permanently inserted in the pipeline, furnace wall, duct, or other point of temperature measurement. This arrangement permits removal of the detector for inspection or test without requiring removal of the well from the system.

Standard C and F design protecting wells for installation in pipes and ducts are shown in Figures 11, and 12. They are constructed of materials suitable for the service. Detectors are spring loaded to force the detector against the bottom of the well to reduce vibration and improve heat transfer between the well and detector. The wall thickness required for the protecting well depends on the pressure the unit must withstand and the mechanical rigidity that is necessary.

Locate the protecting well where it is as free as possible from vibration. This is particularly true in a steam line or pipeline with high frequency vibration. Such vibration, when transferred to the resistance temperature detector, may cause premature detector failure.

High frequency vibration is usually caused by disturbances in high velocity fluid flow. To minimize the disturbance, locate the well where the flow is streamlined -- usually 15 to 25 pipe diameters of straight pipe downstream from any short radius bend, elbow, tee, two or more long radius bends immediately following each other, reducer, expander, or valve. The well may be located close to a single long radius bend, but should enter the pipe so that the well is in a plane at right angles to the plane of the bend. Also, the well may be located close to a gate valve outlet without excessive flow disturbances.

For high temperature installations in which the probe is over 36 inches long, it is recommended that a support be used, as shown in Figure 13.

For pipeline installations where the temperature of the fluid may be less than ambient, install the protecting well and insulate the connection head, then follow the weatherproofing procedure outlined below.

To protect the resistance temperature detector, do not insert it in the protecting well before the well is inserted into the pipe or duct, or when the well is to be welded.

To weatherproof a protecting well used in a Class QDDDD -- C or F design detector circuit, apply Shell Oil Corporation's Aeroshell Grease No. 11, or equal, to both male and female

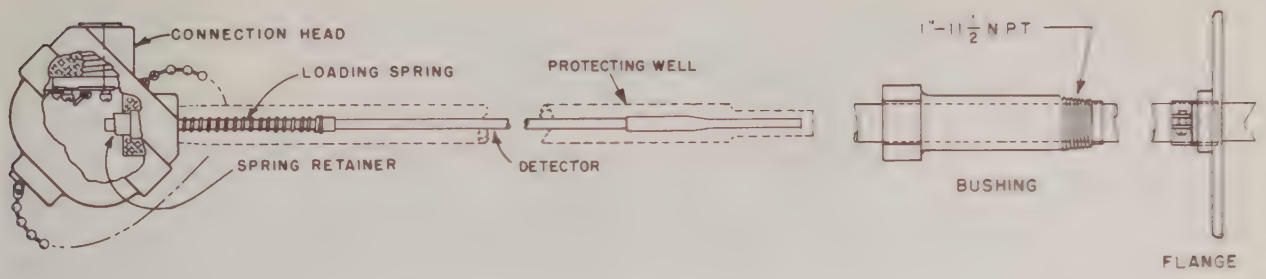


FIGURE 11 - Light Duty RTD Assembly

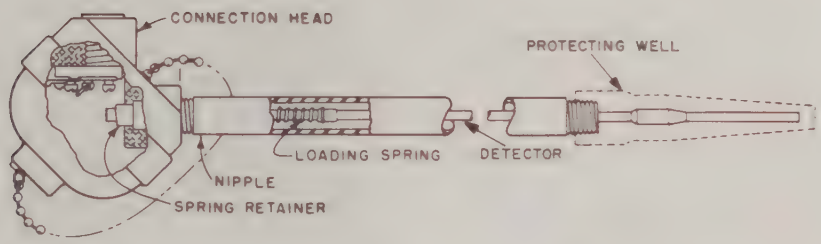


FIGURE 12 - Medium and Heavy Duty RTD Assembly

threads on the connection head body and cap before screwing the cap in place. The grease will not affect the margin of safety of the explosion-proof head.

CAUTION: The protecting well and extension nipple must be absolutely free of foreign material before the resistance temperature detector is installed. The presence of foreign matter will impede detector insertion and heat transfer. Therefore, carefully inspect the well and nipple before and after installation. Cleaning is most easily accomplished before the connection head, nipple, and well are assembled. Do not use deposit leaving, toxic, or volatile solvents for cleaning. If pipe "dope" must be used during installation, apply it to the nipple threads so that it will not enter the nipple or well. If the nipple or well is to be exposed to boiler or flue gases or to other corrosive atmospheres, make sure that all connections are gas-tight.

Do not exceed the maximum temperature and pressure values given in Tables B, C, and D for any application.

NOTE: The maximum pressure temperature for protecting wells used with light duty RTD units is 100 psi of pressure and 1200F.

Receiver

The Class QW, QN, or QQ Temperature Receiver can be mounted in the Type WM55 Recorder in any of the four component positions -- A, B, C, or D -- as shown in Figures 1 thru 4 (rear view of Recorder) or in the Type WM53 Indicator in either the A or B position. The unit, which includes the Receiver wiring board, electronic amplifier, and motor-driven slidewire unit, is secured to the rear of the Recorder or Indicator case by four mounting screws, accessible when the amplifier cover is removed. (See Figure 14 on page 13, also refer to Instruction Section E12-42.)

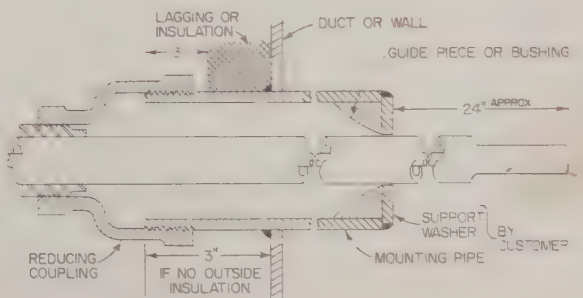


FIGURE 13 - Probe Support

Pres. (Psig)	2-1/4% Croloy Temp. (F)	316 and 347 Stn. Stl. Temp. (F)
1000	1170	1220
2000	1070	1220
3000	1000	1125
4000	990	1050
5000	925	930
6000		300
7000		

TABLE B - Maximum Temperature
Medium Duty Protecting Wells
Pt. No. 669808-□

Pres. (Psig)	2-1 4% Croloy Temp. (F)	347 Stn.Stl. Temp. (F)	316 Stn. Stl. Temp. (F)
1000	1150	1200	1210
2000	1075	1200	1200
3000	1015	1185	1185
4000	1000	1150	1150
5000	985	1090	1120
6000	825	900	1035
7000		315	865
8000		200	300

TABLE C - Maximum Temperature
Heavy Duty, 1" Shank, Protecting Wells
Pt. Nos. 669633-□ and 669634-□

Pres. (Psig)	2-1/4% Croloy Temp. (F)	316 and 347 Stn. Stl. Temp. (F)
1000	1150	1200
2000	1100	1200
3000	1025	1200
4000	1000	1150
5000	950	1100
6000	900	1050
7000	800	950
8000		800
9000		200

TABLE D - Maximum Temperature
Heavy Duty, 1-1/2" Shank, Protecting Wells
Pt. Nos. 6617253-□ and 6617254-□

External electrical connections are made to the measuring and auxiliary terminal blocks adjacent to the Receiver, within the wiring channel on the rear of the Recorder or Indicator.

An adjustable link transmits the motion of the Receiver drive arm to the recording pen or pointer yoke. The Receiver requires a different link for each Recorder or Indicator case position. Each link is stamped with the letter of the position for which it is suitable. The method of connecting and disconnecting adjustable links is illustrated under "Installation of Additional Components" in Instruction Section E12-3.

If the Receiver is furnished already installed in the Recorder or Indicator.

1. Install Recorder or Indicator as outlined in Instruction Section E12-3 under "Installation". Place pens or pointers in service at this time.

2. The assembly has been factory calibrated and should require no further adjustment or calibration.

3. Test power source for correct voltage and frequency.

4. Make external electrical connections to Receiver (Figures 1 thru 4).

5. Turn on Recorder or Indicator. Allow one minute for amplifier warm-up. If Recorder or Indicator does not operate, follow fault correction procedure outlined under "Maintenance", on page 14.

6. Set amplifier sensitivity adjustment, as described in Instruction Section E12-44.

If the Receiver is being added to a Type WM5□ Recorder or Indicator, follow the instruction sheet shipped with the Receiver.

If the Receiver is being changed from one component position to another, use the adjustable link and pen or pointer assembly that is appropriate to the new position. If the pen or pointer assembly for the new component position is not already in service, install the correct assembly and start the pen or pointer, as described in Instruction Section E12-3 under "Installation of Additional Components". Attach the adjustable link to the Receiver drive arm leg that is stamped with the appropriate Recorder or Indicator case position letter.

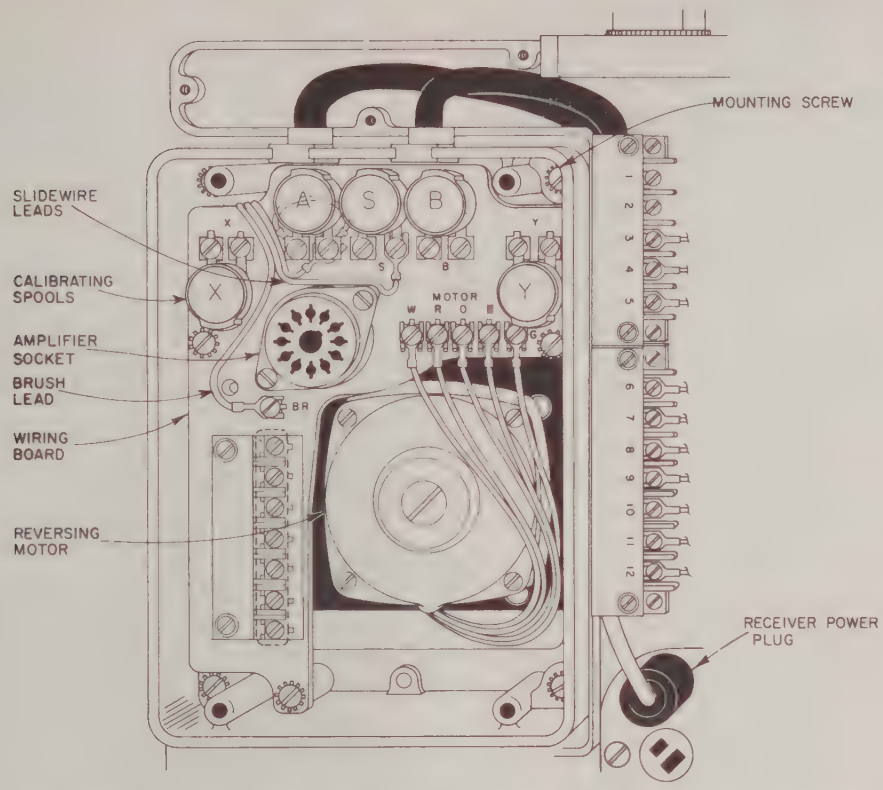


FIGURE 14 - Rear View of Class Q Receiver with Amplifier Removed

ADJUSTMENT AND CALIBRATION

Class QW, QN, and QQ Temperature Receivers are furnished precalibrated. However, before placing the unit in service, check the calibration as outlined below.

Recording Pen or Indicating Pointer

1. With Recorder power switch off, manually rotate Receiver slidewire disc against zero travel limit stop.

2. If pen does not read zero chart, make a slight adjustment with eccentric on link between Receiver drive arm and pen yoke (see Instruction Section E12-42). Do not change length of Receiver drive arm. Drive arm is set at factory and should not be changed.

NOTE: Calibration of recording pen or indicating pointer is necessary when Receiver's case position is changed or when Receiver is added to a Recorder or Indicator previously furnished.

Checking Receiver Calibration

To check receiver calibration, use a decade box with minimum increments of at least 0.1 ohm in place of the detector. (For range spans of 100F or less, minimum increments of 0.01 ohm may be found necessary.) Use a decade box that is known to be correct. Check calibration as follows:

1. Disconnect RTD wiring at Receiver wiring board (see Figures 1 thru 4).

2. Connect one side of decade box (two decade boxes required for class QQ) to Receiver wiring board terminal 5 (terminals 3 and 6 for Class QQ). From the other side of decade box, connect two wires -- one to terminal 3 (terminals 1 and 4 for Class QQ) and one to terminal 4 (terminals 2 and 5 for Class QQ).

3. Set resistance box for various values within temperature range of Receiver, as listed in applicable table (see pages 28 thru 46). For each setting, Receiver should read at corresponding temperature.

4. If readings are incorrect, refer to Item 7 in Fault Correction Chart.

Amplifier Sensitivity Adjustment

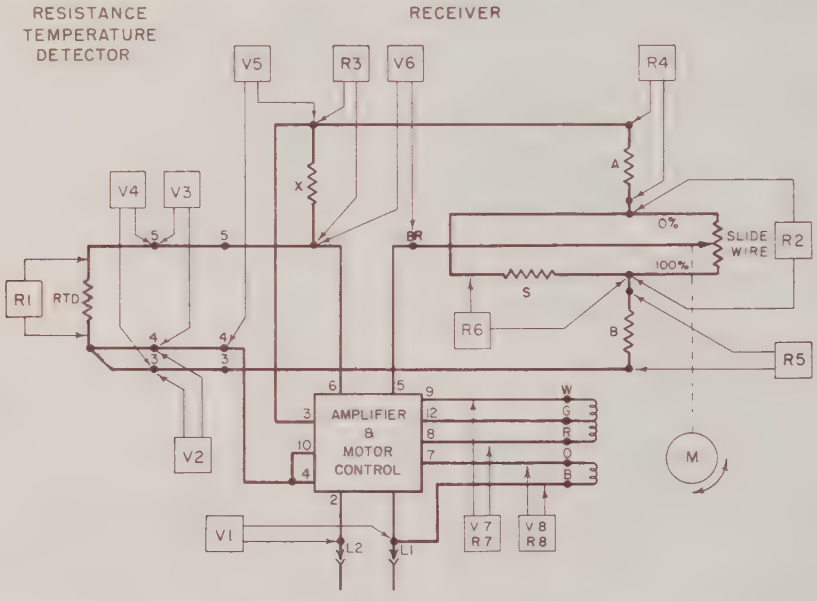
The amplifier is furnished with an indicating light above the motor test jacks. The light is lit when the 60 cycle component of the voltage across the motor control winding is large enough to operate the motor.

With the Receiver measuring a steady variable, turn the sensitivity adjustment shaft clockwise until the light is lit and the motor oscillates continuously. Then turn the shaft counterclockwise until the oscillation stops and the indicating light remains dim or out (see Instruction Section E12-44).

MAINTENANCE

Information pertaining to the measuring circuit is given in the following paragraphs. Maintenance instructions for the Type WM5□ Recorder or Indicator are given in Instruction Section E12-3.

Maintenance information on the Solid-State AC Amplifier is given in Instruction E12-44. Electrical Receivers in general are covered in Instruction Section E12-42.



A-C VOLTAGE MEASUREMENTS MADE ON SCALE HAVING 1000 Ω/V RESISTANCE OR GREATER, EXCEPT WHERE NOTED.

V1-107-127V
V2-0
V3, V4-.25-.778V (10 OHM RTD)
.48-1.38V (32 OHM RTD)
V5-7.5V
V6-0 AT BALANCE (USE VTVM)
V7-3-5V AT BALANCE
7-10V RUNNING
V8-200V AT BALANCE;
210V RUNNING
(HOLTZER-CABOT MOTOR)
240V AT BALANCE;
250V RUNNING
(BODINE MOTOR)

RESISTANCE MEASUREMENTS MADE WITH CONNECTIONS 3, 4, & 5 DISCONNECTED (VALUES APPROXIMATELY ±10% EXCEPT R1)

R1-See TABLES I THRU VI AT REAR OF THIS INSTRUCTION SECTION (DISCONNECT RTD)
R2-100 OHMS (WITH S SPOOL REMOVED)
R3, R4, R5-MARKED ON SPOOLS
R6-MARKED ON SPOOL (REMOVE SPOOL TO MEASURE)

NOTE 1: RESISTANCE BETWEEN CONDUCTORS AND BETWEEN CONDUCTORS AND GROUND MUST BE 250,000 OHMS OR MORE.

NOTE 2: VOLTAGE MEASUREMENTS SHOULD BE MADE WITH AMPLIFIER REMOVED AND CONNECTED TO RECEIVER BY MEANS OF CONNECTING CABLE.

RESISTANCE MEASUREMENTS MADE WITH CONNECTIONS W, R, O, & B (MOTOR) DISCONNECTED (VALUES APPROXIMATELY ±10%)

R7-20 OHMS (HOLTZER-CABOT MOTOR)
-22 OHMS (BODINE MOTOR)
R8-910 OHMS HOLTZER-CABOT MOTOR
-830 OHMS BODINE MOTOR

FIGURE 15 - Class QW and QN Circuit Resistance and Voltage Measurements

Resistance Temperature Detector

Under normal operating conditions the detector will have a long life and will maintain its accuracy. Inspect detectors and wells peridiocally. Occasional replacement of the detector may be made necessary by extreme conditions such as severe mechanical vibration.

Receiver

If the Receiver fails to operate or operates incorrectly when first installed, perform the following checks in the sequence given:

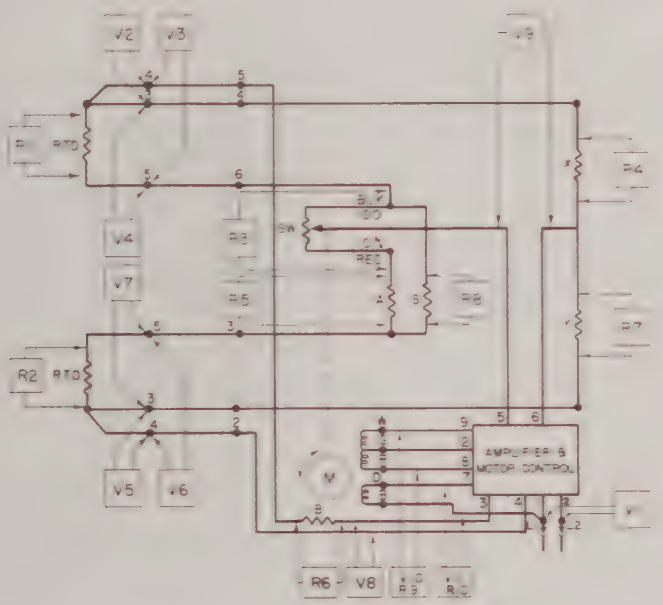
1. Check power supply to Recorder or Indicator (Figures 1 thru 4):

a. Recorder or Indicator case for illumination;

b. Case power switch is on;

c. Main fuses (located adjacent to power switch);

d. Recorder chart drive for motion.



A-C VOLTAGE MEASUREMENTS MADE ON SCALE HAVING 1000Ω/V RESISTANCE OR GREATER, EXCEPT WHERE NOTED.

V1-107-127V
V2, V5-0
V3, V4, V6, V7-0.5-2.5V
V8-7.5V
V9-0 AT BALANCE (USE VTVM)
V10-3-5V AT BALANCE
7-10V RUNNING
V11-200V AT BALANCE:
210V RUNNING
(HOLTZER-CABOT MOTOR)
240V AT BALANCE;
250V RUNNING
(BODINE MOTOR)

RESISTANCE MEASUREMENTS MADE WITH CONNECTIONS 1 THRU 6 DISCONNECTED (VALUES APPROXIMATELY ±10% EXCEPT R1 AND R2)

R1, R2-SEE TABLES I THRU VI AT REAR OF THIS INSTRUCTION SECTION (DISCONNECT RTD)
R3-100Ω (WITH S SPOOL REMOVED)
R4, R5, R6, R7-MARKED ON SPOOLS
R8-MARKED ON SPOOL (REMOVE SPOOL TO MEASURE)

NOTE 1: RESISTANCE BETWEEN CONDUCTORS AND GROUND MUST BE 250,000Ω OR MORE.

NOTE 2: VOLTAGE MEASUREMENTS SHOULD BE MADE WITH AMPLIFER REMOVED AND CONNECTED TO RECEIVER BY MEANS OF CONNECTING CABLE.

RESISTANCE MEASUREMENTS MADE WITH CONNECTIONS W, R, O, & B (MOTOR) DISCONNECTED (VALUES APPROXIMATELY ±10%)

R9-20Ω HOLTZER-CABOT MOTOR
22Ω BODINE MOTOR
R10-910Ω HOLTZER-CABOT MOTOR
-830Ω BODINE MOTOR

FIGURE 16 - Class QQ Circuit Resistance and Voltage Measurements

FAULT CORRECTION CHART

FAULT	PROBABLE CAUSE
1. Pen draws circle on chart and does not respond to changes in temperature, or pointer does not respond to changes in variable.	a. Amplifier failure. Amplifier input (pins 5 and 6 on Amplifier socket) short-circuited. Blown fuse in Amplifier. b. Motor rotor or gear reduction unit frozen or jammed. Slidewire disc assembly should turn freely when power supply to Recorder is off.
2. Erratic pen or pointer motion (not caused by rapidly changing temperature).	a. Faulty slidewire brush contact. Brush must make positive contact (25 to 35 gram load) over entire slidewire travel. Excessive tension will cause wear. Sidewire must be clean and free from all foreign matter. Do not use any abrasives when cleaning. b. Loose connection in measuring circuit or flexible slidewire leads.
3. Pen or pointer drifts and does not follow temperature changes.	a. Class QW & QN: open line or connection to terminal 4. b. Class QQ: open line or connection to terminal 2 or 5; open resistor B; line to terminal 4 or 5 grounded. c. Defective Amplifier. Input to Amplifier pins 5 and 6 open.
4. Pen or pointer is at top of range and does not follow temperature changes.	a. Class QW & QN: open resistor A, or open line or connection to terminal 5; open temperature detector; shorted resistor B or X, or line to terminal 6 grounded. b. Class QQ: open resistor Y, or open line or connection to terminal 1 or 6; "high" temperature detector open; shorted resistor X, shorted "low" temperature detector, or line to terminal 3 grounded.
5. Pen or pointer is at bottom of range and does not follow temperature changes.	a. Class QW & QN: open resitor B or X; open line or connection to terminal 3; shorted resistor A, or 5 shorted to 3 or 4 (shorted temperature detector). Class QW: line to terminal 2 or 4 grounded. Class QN: line to terminal 5 grounded. b. Class QQ: open resistor X, or open line or connection to terminal 3 or 4; "low" temperature element open; shorted resistor Y, shorted "high" temperature detector.
6. Insensitive or sluggish operation.	a. Defective Amplifier. b. Excessive leakage between conductors and power circuits. Refer to external wiring recommendations. Resistance to ground should be in excess of 250,000 ohms. c. Low power supply voltage.
7. Temperature Receiver not in calibration.	a. Damaged or bent linkage, loose adjustment, etc. b. Change in resistance of calibration spools or slidewire as a result of shorted turns or mechanical damage. c. Range increase -- open resistor S, or open slidewire shunt resistor (see Section E12-42). d. The leakage resistance between any lead of a detector and element sheath must be greater than 1,000,000 ohms at normal operating temperature. It must be greater than 10,000,000 ohms at room temperature (check with Recorder or Indicator disconnected).

2. Check power supply to Receiver:

a. Check for torque on slidewire motor. If there is no torque, make checks b and c:

b. Check amplifier fuse.

c. Check amplifier power supply plug.

3. Check external connections: Disconnect RTD at Receiver wiring board and insert decade box (see "Adjustment and Calibration", page 13). Set equal to 50% of range.

a. Class QW and QN

(1) Short terminal 3 to 5. Pen or pointer should go to minimum.

(2) Open connection to terminal 5. Pen or pointer should go to maximum.

(3) Open connection to terminal 3. Pen or pointer should go to minimum.

b. Class QQ

(1) Pen or pointer should go to minimum if:

Terminal 4 shorted to 6 or -
Connection to terminal 3 or 4 opened

(2) Pen or pointer should go to maximum when:

Terminal 1 shorted to 3 or -
Connection to terminal 1 or 6 opened

(3) Short terminal 1 to 2. Pen or pointer should drop slightly.

(4) Short terminal 4 to 5. Pen or pointer should rise slightly.

4. Check circuit voltages and resistance as shown in Figures 15 and 16.

5. Replace Amplifier with a spare, if motor will not reposition when an unbalance voltage is received. Refer to Instruction Section E12-44. If reversing motor fails or operates erratically, refer to Instruction Section E12-42.

DESCRIPTION OF OPERATION

The basic Class QW, QN, or QQ circuit consists of a resistance temperature detector and a Receiver unit, which are connected to form a modified AC Wheatstone bridge, as shown in Figures 17 and 18. Detailed schematics are shown in Figures 19 and 21.

Temperature Bridge

In the circuit shown in Figure 17, the temperature bridge is formed by the calibrating resistance spools (A, B, X, and S), the measuring slidewire (SW), and the resistance temperature detector (T). When the bridge is balanced, voltage e_b is zero. The resistance of the detector, T, varies with detector temperature. When a change in T unbalances the bridge, the amplifier and motor control unit immediately senses the bridge unbalance voltage, e_b, and applies a corrective signal to the slidewire reversing motor, M, to rotate the slidewire so that the bridge is restored to balance. The values of A, B, X, and S are chosen so that the position of the slidewire contact accurately reflects the resistance of the temperature detector.

Although the relation between detector temperature and detector resistance is not exactly

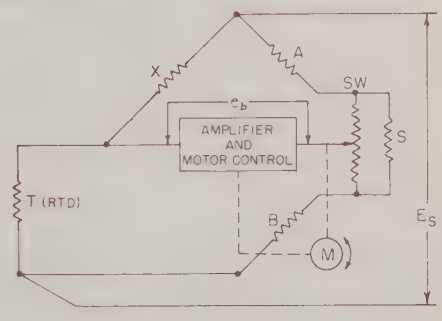


FIGURE 17 - Class QW and QN Bridge Circuit

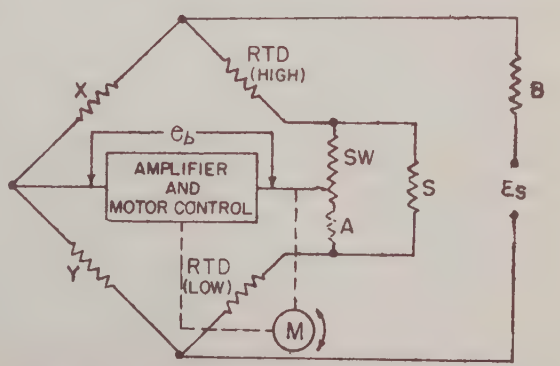
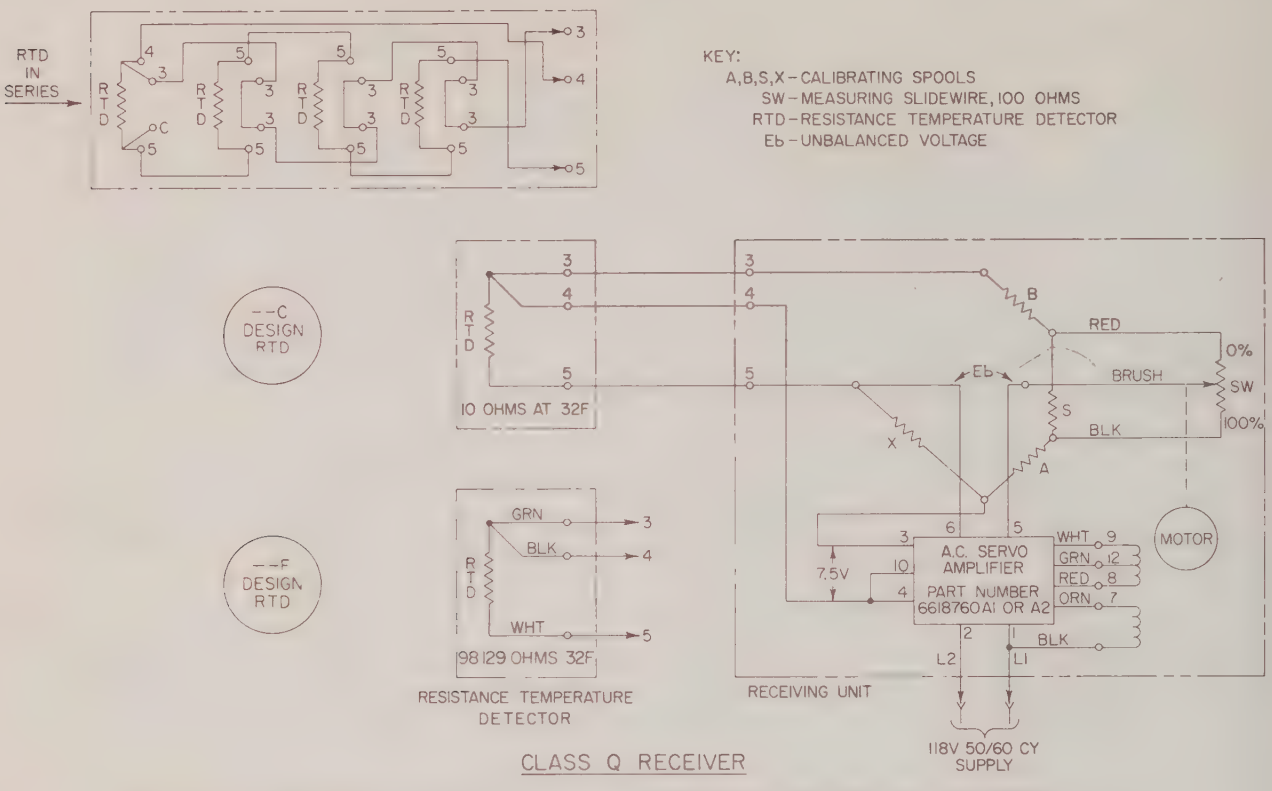


FIGURE 18 - Class QQ Bridge Circuit



NOTE 1:-CLASS QN & QW, BAILEY 10 OHM RTD MAY ALSO BE CONNECTED FOR TEMPERATURE AVERAGING.
EXAMPLE:-2 DETECTORS - 20 OHMS TOTAL AT 32F
3 DETECTORS - 30 OHMS TOTAL AT 32F
4 DETECTORS - 40 OHMS TOTAL AT 32F
(A SUMMATION OF THE RESISTANCE OF EACH 10 OHM RTD EQUALS THE TOTAL BRIDGE DESIGN RESISTANCE.)

NOTE 2:-AC SERVO AMPLIFIER PART NUMBERS
CLASS QW - PART NO. 6618760A1 - PIN 6 IS GROUND
CLASS QN - PART NO. 6618760A2 - PIN 10 IS GROUND

FIGURE 19 - Schematic Wiring Diagram of Class QW and QN Circuits

linear, temperature is recorded or indicated on a uniformly graduated chart or scale because of the shape of the pen or pointer drive cam attached to the slidewire disc.

The method of amplification and motor control is explained in Instruction Section E12-44.

Resistance Temperature Detectors

The Class Q□□□□ -- C or -- F resistance coil is completely enclosed in procelain and packed in alumina powder (see Figure 20). The detector is accurately adjusted and stabilized to have a resistance of 10 ohms (C Design) or 98.129 ohms (F Design) at 32F. See Tables beginning on page 28 for incremental resistance values. All standard detectors used in Class QW or QN circuits are identical and can be interchanged or replaced with similar design detectors. However, detectors used in Class QQ circuits must be closely matched and replacement detectors should be purchased as factory matched pairs.

Measurement of Average Temperature

In certain applications, such as the measurement of flue gas temperature, it is desirable to connect several 10 ohm detectors in series to record or indicate an average temperature. In Class QW and QN circuits, two, three, or four detectors may be connected this way (see Figure 19). 100 ohm detectors are not used for this application.

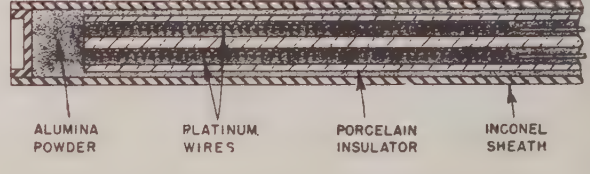


FIGURE 20 - Sensing Element

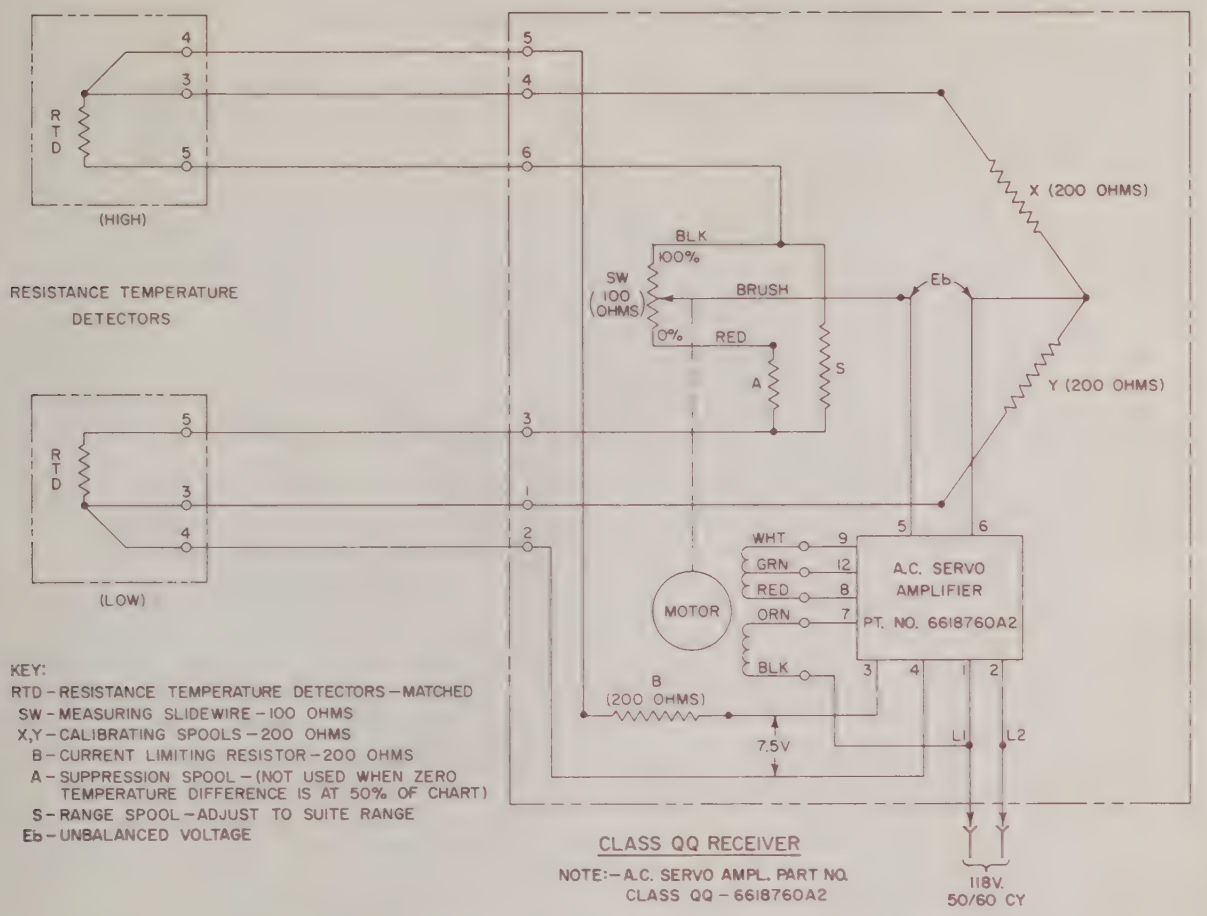


FIGURE 21 - Schematic Wiring Diagram of Class QQ Circuit

When the detector (Class Q□□□□ -- C design) is used to measure average temperature, the resistances are all equal and their total is a multiple of a single standard detector. (Summation of resistance values of all detectors used will give total resistance.) Therefore, the A, B, X, and S resistance spools are sized accordingly.

Measurement of Temperature Difference

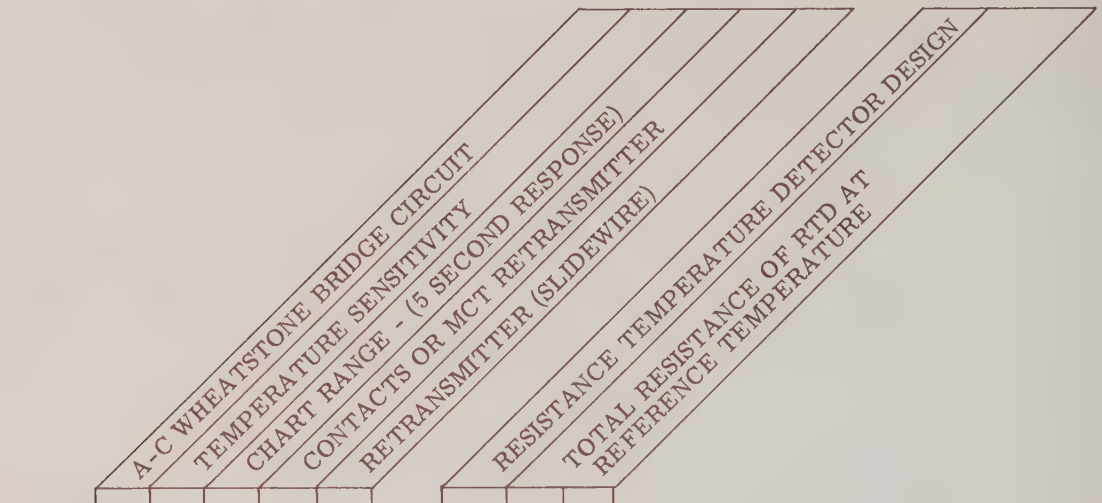
Figure 18 shows the Temperature bridge modified for the measurement of temperature difference. Since the resistance of spools X and Y are equal, slidewire position accurately reflects the difference between the resistance of the two detectors, when proper values of A and S are chosen. The shape of the pen or pointer drive cam permits the recording or indicating of temperature difference on a uniformly graduated chart. A detailed schematic of this bridge is shown in Figure 21.

For a temperature difference circuit, the detectors should be factory matched and detector replacements should be purchased in pairs.

Contacts and Retransmitters

One or two electrical contacts may be furnished with the Class QW, QN, or QQ Receiver for alarms, controls, etc. In addition, retransmitters (slidewire or MCT type) may be installed in the Receiver. These accessories are described in Instruction Section E12-42.

EXPLANATION OF NOMENCLATURE



W	Wide Temp. Span
N	Narrow Temp. Span
Q	Temp. Difference

10, 20, etc., Applies to Class QN & QW --C Design Only. Indicates Total Resistance of RTD's Connected in Series

C	Bailey 10Ω RTD
F	Bailey 100Ω (98.129) RTD

	Recording Range
0	Non-Recording*
1	0-100% Chart Range

0	None
1	100Ω Slidewire
2	2000Ω Slidewire
3	20Ω Slidewire
5	500Ω Center Tap SW

0	No Contacts or MCT
1	High or Low Single Contacts
2	High and Low Double Contacts
5	Single Output MCT Retransmitter, 50%†
6	Single Output MCT Retransmitter, 0%†
7	Double Output MCT Retransmitter, 50%†

† Electrical neutral, per cent of scale.

*Non-Recording unit has ring scale on slidewire disc for readout.

An "X" in any Nomenclature position indicates that in this respect the unit is special. An "X" as a suffix indicates that the unit includes some special feature not covered by Nomenclature.

NOTE: The basic Receiver circuit is designated as a Class QW, QN, or QQ. The resistance temperature detector is designated by the letter following the dashes (see sixth position in Nomenclature above), i. e., Class QW□□□--C indicates a wide temperature span measuring circuit using a 10 ohm resistance temperature detector.

RTD ASSEMBLY IDENTIFICATION

A complete Resistance Temperature Detector (RTD) Assembly requires a protecting well part number and an RTD group part number. The RTD group part number includes the required bushings, nipples etc. but does not include the protecting well.

TABLE 1 - 10 OHM RTD ASSEMBLY FOR LIGHT DUTY PROTECTING WELLS

RTD Group Part No.*	Detector			Connecting Head Part No.	Mounting Accessory	Protecting Well (316 Stainless Steel)	
	Terminals Used**	Part No.	(A) Overall Length (Inches)			Length (Inches)	Part No.
669399J1	3T	669239A4	31 5/16	669635A2	Bushing 663902A2	2 7/8	6616567A1
J2		A5	43 5/16			4 1/8	A2
J3		A6	55 5/16			5 3/8	A3
J4		6617873A1	67 5/16			6 5/8	A4
J5	4T	669240A4	31 5/16	669635A3		2 7/8	A1
J6		A5	43 5/16			4 1/8	A2
J7		A6	55 5/16			5 3/8	A3
J8		6617873A2	67 5/16			6 5/8	A4
669399A17	3T	669239A4	31 5/16	669635A2	Flange 66934E1	2 7/8	6616567A1
A18		A5	43 5/16			4 1/8	A2
A19		A6	55 5/16			5 3/8	A3
A20		6617873A1	67 5/16			6 5/8	A4
A21	4T	669240A4	31 5/16	669635A3		2 7/8	A1
A22		A5	43 5/16			4 1/8	A2
A23		A6	55 5/16			5 3/8	A3
A24		6617873A2	67 5/16			6 5/8	A4

*Group Part Number includes Detector, Connecting Head, Mounting Accessory, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 5). Protecting Well not included.

TABLE 2 - 10 OHM RTD ASSEMBLY FOR MEDIUM DUTY WELLS

RTD Group Part No.*	Detector			Connecting Head Part No.	Protecting Well		
	Terminals Used**	Part No.	Overall Length (Inches)		(B) Length (Inches)	316 Stainless Steel Part No.	2 1/4% Chrome Moly Part No.
6610447A1	3T	669239A1	10 5/16	669635A2	5 3/8	669808A1	669808A4
A2		A2	13 5/16		8 3/8	A2	A5
A3		A3	19 5/16		14 3/8	A3	A6
A4	4T	669240A1	10 5/16	669635A3	5 3/8	A1	A4
A5		A2	13 5/16		8 3/8	A2	A5
A6		A3	19 5/16		14 3/8	A3	A6

*Group Part Number includes Detector, 3 INCH NIPPLE (L Dim.) Pt. No. 669632A1, Connecting Head, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 6). Protecting Well not included.

3" Extension Nipple, Pt. No. 669632A1 (L Dimension) used in all units.

**When two or more RTD's are connected in series for averaging temperatures, all but one must have 4 terminals.

Bailey

TABLE 3 - 10 OHM RTD ASSEMBLY FOR HEAVY DUTY, 1" O. D. SHANK, WELLS

RTD Group Part No.*	Detector			Connecting Head Part No.	Extension Nipple	
	Terminals Used**	Part No.	Overall Length (Inches)		(L) Length (Inches)	Part No.
6610446A1	3T	669239A1	10-5/16	669635A2	3	669632A1
A2		A2	13-5/16		6	A2
A3		A3	19-5/16		12	A3
A4		A4	31-5/16		24	A4
A5		A5	43-5/16		36	A5
A6		A6	55-5/16		48	A6
A7		A7	67-5/16		60	A7
A8		A8	79-5/16		72	A8
A9		A9	91-5/16		84	A9
A10		A10	103-5/16		96	A10
A11		A11	115-5/16		108	A11
A12		A12	127-5/16		120	A12
A13		A13	139-5/16		132	A13
A14		A14	151-5/16		144	A14
A15		A15	163-5/16		156	A15
A16		A16	175-5/16		168	A16
A17		A17	187-5/16		180	A17
A18	4T	669240A1	10-5/16	669635A3	3	669632A1
A19		A2	13-5/16		6	A2
A20		A3	19-5/16		12	A3
A21		A4	31-5/16		24	A4
A22		A5	43-5/16		36	A5
A23		A6	55-5/16		48	A6
A24		A7	67-5/16		60	A7
A25		A8	79-5/16		72	A8
A26		A9	91-5/16		84	A9
A27		A10	103-5/16		96	A10
A28		A11	115-5/16		108	A11
A29		A12	127-5/16		120	A12
A30		A13	139-5/16		132	A13
A31		A14	151-5/16		144	A14
A32		A15	163-5/16		156	A15
A33		A16	175-5/16		168	A16
A34		A17	187-5/16		180	A17

Protecting Wells		
Part No.	Type	Material
669633A1	Threaded	316 Stainless Steel
A2		347 Stainless Steel
A3		2¼% Chrome Moly
669634A1	Weld-In	316 Stainless Steel
A2		347 Stainless Steel
A3		2¼% Chrome Moly

Well Length=5⅜" (B Dim.)

*Group Part Number includes Detector, Nipple, Connecting Head, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 7). Protecting Well not included.

**When two or more RTD's are connected in series for averaging temperatures, all but one must have 4 terminals.

TABLE 4 - 10 OHM RTD ASSEMBLY FOR HEAVY DUTY, 1-1/2" O. D. SHANK, WELLS

RTD Group Part No.*	Detector			Connecting Head Part No.	Extension Nipple	
	Terminals Used**	Part No.	Overall Length (Inches)		(L) Length (Inches)	Part No.
6620945A1	3T	669239A2	13 5/16	669635A2	2	6617292A1
A2		A3	19 5/16		8	A2
A3		A4	31 5/16		20	A3
A4		A5	43 5/16		32	A4
A5		A6	55 5/16		44	A5
A6		A7	67 5/16		56	A6
A7		A8	79 5/16		68	A7
A8		A9	91 5/16		80	A8
A9		A10	103 5/16		92	A9
A10		A11	115 5/16		104	A10
A11		A12	127 5/16		116	A11
A12		A13	139 5/16		128	A12
A13		A14	151 5/16		140	A13
A14		A15	163 5/16		152	A14
A15		A16	175 5/16		164	A15
A16		A17	187 5/16		176	A16
6620945A17	4T	669240A2	13 5/16	669635A3	2	6617292A1
A18		A3	19 5/16		8	A2
A19		A4	31 5/16		20	A3
A20		A5	43 5/16		32	A4
A21		A6	55 5/16		44	A5
A22		A7	67 5/16		56	A6
A23		A8	79 5/16		68	A7
A24		A9	91 5/16		80	A8
A25		A10	103 5/16		92	A9
A26		A11	115 5/16		104	A10
A27		A12	127 5/16		116	A11
A28		A13	139 5/16		128	A12
A29		A14	151 5/16		140	A13
A30		A15	163 5/16		152	A14
A31		A16	175 5/16		164	A15
A32		A17	187 5/16		176	A16

Protecting Wells		
Part No.	Type	Material
6617253A1	Weld-in	316 Stainless Steel
A2		347 Stainless Steel
A3		2 1/4% Chrome Moly
6617254A1	Threaded	316 Stainless Steel
A2		347 Stainless Steel
A3		2 1/4% Chrome Moly

Well Length = 9 3/8" (B Dim.)

*Group Part Number includes Detector, Nipple, Connecting Head, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 7). Protecting Well not included.

**When two or more RTD's are connected in series for averaging temperatures, all but one must have 4 terminals.

TABLE 5 - 100 OHM RTD ASSEMBLY FOR LIGHT DUTY WELLS

RTD Group Part No.*	Detector			Mounting Accessory	Protecting Well (316 Stainless Steel)	
	Terminals Used	Part No.	(A) Overall Length (Inches)		Length (Inches)	Part No.
6619999A1	3T	6619998A4	31 5/16	Bushing 663902A2	29 7/8	6616567A1
A2		A5	43 5/16		41 7/8	A2
A3		A6	55 5/16		53 7/8	A3
A4		A7	67 5/16		65 7/8	A4
6619999A5		6619998A4	31 5/16	Flange Assy. 66934E1	29 7/8	6616567A1
A6		A5	43 5/16		41 7/8	A2
A7		A6	55 5/16		53 7/8	A3
A8		A7	67 5/16		65 7/8	A4

*Group Part Number includes Detector, Connecting Head Pt. No. 669635A2, Mounting Accessory, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 5). Protecting Well not included.

TABLE 6 - 100 OHM RTD ASSEMBLY FOR MEDIUM DUTY WELLS

RTD Group Part No.*	Detector			Protecting Well		
	Terminals Used	Part No.	Length (Inches)	(B) Well Length (Inches)	316 Stainless Steel Part No.	2 1/4% Chrome Moly Part No.
6620569A1	3T	6619998A1	10 5/16	5 3/8	669808A1	669808A4
A2		A2	13 5/16	8 3/8	A2	A5
A3		A3	19 5/16	14 3/8	A3	A6

*Group Part Number includes Detector, 3 INCH NIPPLE (L Dim.) Pt. No. 669632A1, Connecting Head Pt. No. 669635A2, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 6). Protecting Well not included

3" Extension Nipple, Pt. No. 669632A1 (L Dimension) used in all units.

TABLE 7 - 100 OHM RTD ASSEMBLY FOR HEAVY DUTY, 1" O.D. SHANK, WELLS

RTD Group Part No.*	Detector			Extension Nipple	
	Terminals Used	Part No.	Overall Length (Inches)	(L) Length (Inches)	Part No.
6620568A1	3T	6619998A1	10 5/16	3	669632A1
A2		A2	13 5/16	6	A2
A3		A3	19 5/16	12	A3
A4		A4	31 5/16	24	A4

Protecting Wells		
Part No.	Type	Material
669633A1	Threaded	316 Stainless Steel
A2		347 Stainless Steel
A3		2 1/4% Chrome Moly
669634A1	Weld-In	316 Stainless Steel
A2		347 Stainless Steel
A3		2 1/4% Chrome Moly

Well Length = 5 3/8" (B Dim.)

*Group Part Number includes Detector, Nipple, Connecting Head Pt. No. 669635A2, Loading Spring Pt. No. 669533A1 and Spring Retainer Pt. No. 669531A1 (see Fig. 7). Protecting Well not included.

SPECIFICATIONS

A. OPERATING CONDITIONS

	10 ohm RTD	100 ohm (98.129) RTD
Temperature Range	330F to 1100F -200C to 600C	-330F to 600F -200C to 316C
Element Resistance	10 ohms at 32F	98.129 ohms at 32F

Maximum Connecting Head Ambient Temperature 250F

Temperature Characteristic

Reference Grade Platinum Wire Sensitive Element:

$$\frac{\text{Element Resistance at 212F}}{\text{Element Resistance at 32F}} = \text{no less than } 1.3920$$

Used in Wheatstone Bridge Configuration for:

a. Single Point Temperature Measurement

b. Average Temperature (10 ohm RTD only, up to four in series)

c. Temperature Difference (difference of two RTDs)

Standard Receiver . . . . . Class Q□ Receiver in WM5□ Recorder or Indicator

B. REFERENCE PERFORMANCE CHARACTERISTICS

Accuracy . . . . . ±1.0F or ±1/2% of measured temperature, whichever is larger

Stability . . . . . better than 1/2F after 6000 hours at 1000F

Resistance from Element to Sheath . . . . . 10 megohms with 50 VDC at 75F

Speed of Response . . . . . refer to Table E on following page

RTD GROUP AND PROTECTING WELL COMBINATION	RESPONSE TIME
Bare RTD (without protecting well)	5.0 seconds
RTD in Light Duty Well Pt. No. 6616567-□	14.0 seconds
RTD in Medium Duty Well Pt. No. 669808-□	15.3 seconds
RTD in Heavy Duty Well Pt. No. 669633-□ Pt. No. 669634-□ (1 inch shank)	18.3 seconds
RTD in Heavy Duty Well Pt. No. 6617253-□ Pt. No. 6617254-□ (1-1/2 inch shank)	49.5 seconds

TABLE E- Speed of Response of 10 ohm and 100 ohm RTD in 1/4 inch Bore Protecting Well

NOTE: Response time is defined as time in seconds for RTD to respond to 63.2% of step change when immersed in water flowing at 3 feet per second.

C. SPECIAL CONDITIONS

RTDs are furnished under one of the following categories:

Commercial

Standard accuracy ±0.5% of measured temperature.

Matched

For temperature difference measurements, the RTDs are matched to within ±0.5F at the ice point. This retains accuracy with the standard bridge configuration.

Selected

The RTD is selected to be within ±0.25% of the published resistance vs temperature tables.

Certified

The RTD is independently checked against a Reference Standard to produce a calibration traceable to NBS. A check is made at standard temperatures such as ice, steam, zinc, etc. points. Each certified RTD is furnished with its individual calibration (ohms vs temperature) table.

REPLACEMENT PARTS

Ordering Individual Parts

Figure 23 shows the assembly of Class QW, QN, and QQ Temperature Receivers. This drawing will normally apply to the Receiver furnished. However, there may be individual differences in specific Receivers because of:

a. Design changes made since the printing of this Instruction Section.

b. Special design of the Receiver furnished to make it suitable for a special application.

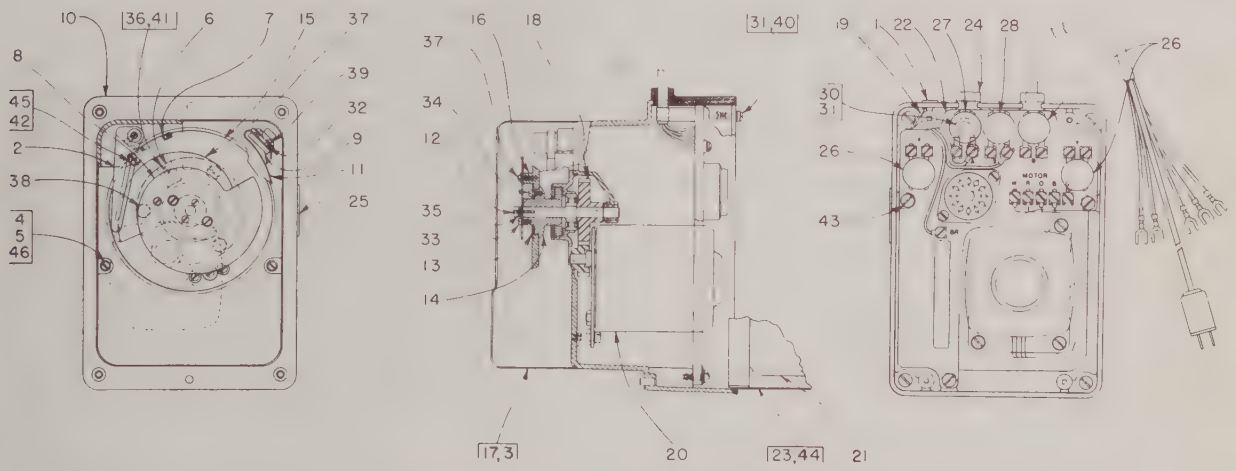
Therefore, when ordering parts, assure correct replacements by specifing on the order:

1. Complete nomenclature (Class and Code Number) of instrument for which parts are desired.

2. Parts Drawing on which each part is illustrated. (The Parts Drawing number is given in the title for the Figure.)

Spare Parts Kits

The applicable Spare Parts Kit referred to in Parts Drawing E51-27 (Figure 22) should be carried in stock. Specify the Spare Parts Kit part number to order a complete kit.



ITEM	PART NO.	NAME
1	CODE LABEL	SPECIFY NUMBER WHEN ORDERING PARTS
2	668059-1	CAM FOLLOWER SHAFT & DRIVE ARM ASSY
3	199287-1	LUBSAC & TUBE ASSY (1 REQD FOR HOLTZER-CABOT MOTORS)
4	6614001-1	COVER SCREW, 2 REQD
5	6614002-1	COVER SUPPORT STUD, 2 REQD
6	68839-2	CAPILLARY CLIP
7	661483-1	CAM ARM SPRING
8	666433-1	CAM
9	666321-1	BRUSH SUPPORT
10	666431-1	MTG. BRACKET ASSY
11	666366-1	BRUSH ASSY
12	663016-1	SPRING KEY
13	661501-1	DISC CLAMP
14	666326-1	DISC HUB
15	661805-35	DISC ASSY
16	662153-1	DOWEL SLEEVE
17	666340-1	SLIDEWIRE COVER
18	666320-1	SHAFT GEAR & BEARING ASSY
19	6612342-1	INSULATING PLATE
20	6618667-1	MOTOR ASSY
21	SEE TABLE	AMPLIFIER ASSY
22	SEE TABLE	WIRING ASSY
23	667206-1	AMPLIFIER COVER ASSY
24	35396-1	GROMMET
25	1961013-1	IDENTIFICATION PLATE, 2 REQD
26	666364-1	SPOOL (SEE TABLE)
27	666719-1	MOUNTING SCREW, 4 REQD
28	666364-4	SPOOL, 3 REQD, (CL QQ ONLY)
29	666364-2	SPOOL (CLASS QQ ONLY)
30	1941520-1	SPADE TERMINAL (CL QQ ONLY)
31	R2041-0400	B. M. CO. # 140 LEADWIRE (CLASS QQ ONLY)
32	3-48x3/16	PAN HEAD SCREW, 2 REQD
33	3-48x1/4	PAN HEAD SCREW, 2 REQD
34	3-48x1/4	FILLISTER HEAD SCR, 2 REQD
35	3-48x3/16	HEADLESS CUP PT SET SCREW
36	4-40x3/16	PAN HEAD SCREW
37	4-40x5/16	ROUND HEAD THD CUTTING SCR
38	6-32x1/4	PAN HD EXT SEMS, 3 REQD
39	6-32x5/16	PAN HD EXT SEMS, 2 REQD
40	#1108-00	SHAKEPROOF LKWASH., 4 REQD
41	#1204-00	SHAKEPROOF LOCKWASHER
42	8-32x1/2	PAN HEAD SCREW, 3 REQD
43	8-32x1/2	PAN HD EXT SEMS, 3 REQD
44	1/4-20x7/16	PAN HEAD SCREW
45	#8 SAE	LOCKWASHER, 3 REQD
46	#10 SAE	LOCKWASHER, 2 REQD

TABLE			
CLASS	ITEM 21	ITEM 22	ITEM 26
QN100	6618760-2	6618818-1	4 REQD
QQ100	6618760-2	6618819-1	1 REQD
QW100	6618760-1	6618818-1	4 REQD

SPARE PARTS KIT	
SPARE PARTS KIT PART NUMBER 250018-1	
QTY	PART NO.
1	6618667-1 MOTOR ASSY
1	666366-1 BRUSH ASSY
2	194776-11001 FUSE

FIGURE 22 - Parts Drawing E51-27, Class QW, QN and QQ Receivers

TEMPERATURE VS RESISTANCE TABLES

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TABLE I - FAHRENHEIT SCALE
CLASS Q □□□□--C DETECTORS (10 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F									
							-330	-320	-310	-300
0							1.649	1.894	2.137	2.379
-1							1.625	1.869	2.113	2.355
-2							1.600	1.845	2.089	2.331
-3							1.576	1.821	2.064	2.307
-4							1.551	1.796	2.040	2.283
-300F										
-5							1.527	1.772	2.016	2.258
-6							1.502	1.747	1.991	2.234
-7							1.477	1.723	1.967	2.210
-8							1.453	1.698	1.943	2.186
-9							1.428	1.674	1.918	2.161
F	-290	-280	-270	-260	-250	-240	-230	-220	-210	-200
0	2.621	2.861	3.100	3.338	3.576	3.812	4.048	4.282	4.516	4.750
-1	2.597	2.837	3.076	3.315	3.552	3.788	4.024	4.259	4.493	4.726
-2	2.572	2.813	3.052	3.291	3.528	3.765	4.001	4.236	4.470	4.703
-3	2.548	2.789	3.028	3.267	3.505	3.741	3.977	4.212	4.446	4.680
-4	2.524	2.765	3.004	3.243	3.481	3.718	3.954	4.189	4.423	4.656
-200F										
-5	2.500	2.741	2.981	3.219	3.457	3.694	3.930	4.165	4.400	4.633
-6	2.476	2.717	2.957	3.195	3.433	3.670	3.906	4.142	4.376	4.610
-7	2.452	2.693	2.933	3.172	3.410	3.647	3.883	4.118	4.353	4.586
-8	2.428	2.669	2.909	3.148	3.386	3.623	3.859	4.095	4.329	4.563
-9	2.404	2.645	2.885	3.124	3.362	3.599	3.836	4.071	4.306	4.540
F	-190	-180	-170	-160	-150	-140	-130	-120	-110	-100
0	4.982	5.214	5.445	5.676	5.905	6.135	6.363	6.591	6.819	7.046
-1	4.959	5.191	5.422	5.653	5.882	6.112	6.340	6.568	6.796	7.023
-2	4.936	5.168	5.399	5.629	5.859	6.089	6.318	6.546	6.773	7.000
-3	4.912	5.144	5.376	5.606	5.836	6.066	6.295	6.523	6.751	6.978
-4	4.889	5.121	5.353	5.583	5.813	6.043	6.272	6.500	6.728	6.955
-100F										
-5	4.866	5.098	5.330	5.560	5.791	6.020	6.249	6.477	6.705	6.932
-6	4.843	5.075	5.306	5.537	5.768	5.997	6.226	6.454	6.682	6.910
-7	4.819	5.052	5.283	5.514	5.745	5.974	6.203	6.432	6.660	6.887
-8	4.796	5.029	5.260	5.491	5.722	5.951	6.180	6.409	6.637	6.864
-9	4.773	5.005	5.237	5.468	5.699	5.928	6.157	6.386	6.614	6.841
F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0
0	7.272	7.498	7.724	7.949	8.173	8.398	8.621	8.845	9.068	9.290
-1	7.250	7.476	7.701	7.926	8.151	8.375	8.599	8.822	9.045	9.268
-2	7.227	7.453	7.679	7.904	8.129	8.353	8.577	8.800	9.023	9.246
-3	7.204	7.430	7.656	7.881	8.106	8.330	8.554	8.778	9.001	9.224
-4	7.182	7.408	7.634	7.859	8.084	8.308	8.532	8.755	8.979	9.201
0F										
-5	7.159	7.385	7.611	7.836	8.061	8.286	8.510	8.733	8.956	9.179
-6	7.136	7.363	7.589	7.814	8.039	8.263	8.487	8.711	8.934	9.157
-7	7.114	7.340	7.566	7.791	8.016	8.241	8.465	8.688	8.912	9.135
-8	7.091	7.317	7.543	7.769	7.994	8.218	8.442	8.666	8.889	9.112
-9	7.068	7.295	7.521	7.746	7.971	8.196	8.420	8.644	8.867	9.090

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TABLE I - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--C DETECTORS (10 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

	F	0	10	20	30	40	50	60	70	80	90
	0	9.290	9.512	9.734	9.956	10.177	10.398	10.618	10.838	11.058	11.277
	1	9.313	9.535	9.756	9.978	10.199	10.420	10.640	10.860	11.080	11.299
	2	9.335	9.557	9.779	10.000	10.221	10.442	10.662	10.882	11.101	11.321
	3	9.357	9.579	9.801	10.022	10.243	10.464	10.684	10.904	11.123	11.343
	4	9.379	9.601	9.823	10.044	10.265	10.486	10.706	10.926	11.145	11.364
0F											
	5	9.401	9.623	9.845	10.066	10.287	10.508	10.728	10.948	11.167	11.386
	6	9.424	9.646	9.867	10.088	10.309	10.530	10.750	10.970	11.189	11.408
	7	9.446	9.668	9.889	10.111	10.331	10.552	10.772	10.992	11.211	11.430
	8	9.468	9.690	9.911	10.133	10.353	10.574	10.794	11.014	11.233	11.452
	9	9.490	9.712	9.934	10.155	10.376	10.596	10.816	11.036	11.255	11.474
	F	100	110	120	130	140	150	160	170	180	190
	0	11.496	11.714	11.933	12.150	12.368	12.585	12.802	13.018	13.234	13.450
	1	11.518	11.736	11.954	12.172	12.390	12.607	12.823	13.040	13.256	13.471
	2	11.540	11.758	11.976	12.194	12.411	12.628	12.845	13.061	13.277	13.493
	3	11.561	11.780	11.998	12.216	12.433	12.650	12.867	13.083	13.299	13.514
	4	11.583	11.802	12.020	12.237	12.455	12.672	12.888	13.105	13.320	13.536
100F											
	5	11.605	11.823	12.041	12.259	12.476	12.693	12.910	13.126	13.342	13.557
	6	11.627	11.845	12.063	12.281	12.498	12.715	12.932	13.148	13.364	13.579
	7	11.649	11.867	12.085	12.303	12.520	12.737	12.953	13.169	13.385	13.601
	8	11.671	11.889	12.107	12.324	12.542	12.758	12.975	13.191	13.407	13.622
	9	11.692	11.911	12.129	12.346	12.563	12.780	12.996	13.213	13.428	13.644
	F	200	210	220	230	240	250	260	270	280	290
	0	13.665	13.880	14.095	14.309	14.523	14.736	14.949	15.162	15.375	15.587
	1	13.687	13.902	14.116	14.330	14.544	14.758	14.971	15.183	15.396	15.608
	2	13.708	13.923	14.138	14.352	14.565	14.779	14.992	15.205	15.417	15.629
	3	13.730	13.944	14.159	14.373	14.587	14.800	15.013	15.226	15.438	15.650
	4	13.751	13.966	14.180	14.394	14.608	14.822	15.035	15.247	15.459	15.671
200F											
	5	13.773	13.987	14.202	14.416	14.630	14.843	15.056	15.268	15.481	15.693
	6	13.794	14.009	14.223	14.437	14.651	14.864	15.077	15.290	15.502	15.714
	7	13.816	14.030	14.245	14.459	14.672	14.885	15.098	15.311	15.523	15.735
	8	13.837	14.052	14.266	14.480	14.694	14.907	15.120	15.332	15.544	15.756
	9	13.859	14.073	14.287	14.501	14.715	14.928	15.141	15.353	15.565	15.777
	F	300	310	320	330	340	350	360	370	380	390
	0	15.798	16.010	16.221	16.431	16.641	16.851	17.061	17.270	17.479	17.687
	1	15.819	16.031	16.242	16.452	16.662	16.872	17.082	17.291	17.500	17.708
	2	15.841	16.052	16.263	16.473	16.683	16.893	17.103	17.312	17.521	17.729
	3	15.862	16.073	16.284	16.494	16.704	16.914	17.124	17.333	17.541	17.750
	4	15.883	16.094	16.305	16.515	16.725	16.935	17.145	17.354	17.562	17.771
300F											
	5	15.904	16.115	16.326	16.536	16.746	16.956	17.165	17.374	17.583	17.791
	6	15.925	16.136	16.347	16.557	16.767	16.977	17.186	17.395	17.604	17.812
	7	15.946	16.157	16.368	16.578	16.788	16.998	17.207	17.416	17.625	17.833
	8	15.967	16.178	16.389	16.599	16.809	17.019	17.228	17.437	17.646	17.854
	9	15.989	16.200	16.410	16.620	16.830	17.040	17.249	17.458	17.666	17.875

TABLE I - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--C DETECTORS (10 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

	F	400	410	420	430	440	450	460	470	480	490
	0	17.895	18.103	18.310	18.517	18.724	18.930	19.136	19.342	19.547	19.752
	1	17.916	18.124	18.331	18.538	18.745	18.951	19.157	19.362	19.568	19.772
	2	17.937	18.145	18.352	18.559	18.765	18.972	19.177	19.383	19.588	19.793
	3	17.958	18.165	18.373	18.579	18.786	18.992	19.198	19.403	19.608	19.813
	4	17.978	18.186	18.393	18.600	18.807	19.013	19.219	19.424	19.629	19.834
400F											
	5	17.999	18.207	18.414	18.621	18.827	19.033	19.239	19.444	19.649	19.854
	6	18.020	18.228	18.435	18.641	18.848	19.054	19.260	19.465	19.670	19.875
	7	18.041	18.248	18.455	18.662	18.868	19.075	19.280	19.485	19.690	19.895
	8	18.062	18.269	18.476	18.683	18.889	19.095	19.301	19.506	19.711	19.915
	9	18.082	18.290	18.497	18.703	18.910	19.116	19.321	19.526	19.731	19.936

	F	500	510	520	530	540	550	560	570	580	590
	0	19.956	20.160	20.364	20.568	20.771	20.973	21.176	21.377	21.579	21.780
	1	19.977	20.181	20.384	20.588	20.791	20.993	21.196	21.398	21.599	21.800
	2	19.997	20.201	20.405	20.608	20.811	21.014	21.216	21.418	21.619	21.820
	3	20.018	20.222	20.425	20.628	20.831	21.034	21.236	21.438	21.639	21.841
	4	20.038	20.242	20.446	20.649	20.852	21.054	21.256	21.458	21.660	21.861
500F											
	5	20.058	20.262	20.466	20.669	20.872	21.074	21.277	21.478	21.680	21.881
	6	20.079	20.283	20.486	20.689	20.892	21.095	21.297	21.498	21.700	21.901
	7	20.099	20.303	20.507	20.710	20.912	21.115	21.317	21.519	21.720	21.921
	8	20.120	20.323	20.527	20.730	20.933	21.135	21.337	21.539	21.740	21.941
	9	20.140	20.344	20.547	20.750	20.953	21.155	21.357	21.559	21.760	21.961

	F	600	610	620	630	640	650	660	670	680	690
	0	21.981	22.182	22.382	22.581	22.781	22.980	23.179	23.377	23.575	23.773
	1	22.001	22.202	22.402	22.601	22.801	23.000	23.198	23.397	23.595	23.792
	2	22.021	22.222	22.422	22.621	22.821	23.020	23.218	23.417	23.614	23.812
	3	22.041	22.242	22.442	22.641	22.841	23.040	23.238	23.436	23.634	23.832
	4	22.061	22.262	22.462	22.661	22.861	23.059	23.258	23.456	23.654	23.851
600F											
	5	22.081	22.282	22.482	22.681	22.880	23.079	23.278	23.476	23.674	23.871
	6	22.101	22.302	22.502	22.701	22.900	23.099	23.298	23.496	23.694	23.891
	7	22.121	22.322	22.522	22.721	22.920	23.119	23.317	23.516	23.713	23.911
	8	22.142	22.342	22.542	22.741	22.940	23.139	23.337	23.535	23.733	23.930
	9	22.162	22.362	22.562	22.761	22.960	23.159	23.357	23.555	23.753	23.950

	F	700	710	720	730	740	750	760	770	780	790
	0	23.970	24.167	24.363	24.559	24.755	24.951	25.146	25.340	25.535	25.729
	1	23.989	24.186	24.383	24.579	24.775	24.970	25.165	25.360	25.554	25.748
	2	24.009	24.206	24.402	24.599	24.794	24.990	25.185	25.379	25.574	25.767
	3	24.029	24.226	24.422	24.618	24.814	25.009	25.204	25.399	25.593	25.787
	4	24.049	24.245	24.442	24.638	24.833	25.029	25.224	25.418	25.612	25.806
700F											
	5	24.068	24.265	24.461	24.657	24.853	25.048	25.243	25.438	25.632	25.826
	6	24.088	24.285	24.481	24.677	24.872	25.068	25.262	25.457	25.651	25.845
	7	24.108	24.304	24.501	24.696	24.892	25.087	25.282	25.476	25.671	25.864
	8	24.127	24.324	24.520	24.716	24.911	25.107	25.301	25.496	25.690	25.884
	9	24.147	24.344	24.540	24.736	24.931	25.126	25.321	25.515	25.709	25.903

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TABLE I - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--C DETECTORS (10 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F	800	810	820	830	840	850	860	870	880	890
0	25.922	26.116	26.308	26.501	26.693	26.885	27.076	27.268	27.458	27.649
1	25.942	26.135	26.328	26.520	26.712	26.904	27.096	27.287	27.477	27.668
2	25.961	26.154	26.347	26.540	26.732	26.923	27.115	27.306	27.496	27.687
3	25.980	26.173	26.366	26.559	26.751	26.943	27.134	27.325	27.515	27.706
4	26.000	26.193	26.386	26.578	26.770	26.962	27.153	27.344	27.535	27.725
800F										
5	26.019	26.212	26.405	26.597	26.789	26.981	27.172	27.363	27.554	27.744
6	26.038	26.231	26.424	26.616	26.808	27.000	27.191	27.382	27.573	27.763
7	26.058	26.251	26.443	26.636	26.828	27.019	27.210	27.401	27.592	27.782
8	26.077	26.270	26.463	26.655	26.847	27.038	27.229	27.420	27.611	27.801
9	26.096	26.289	26.482	26.674	26.866	27.057	27.249	27.439	27.630	27.820

F	900	910	920	930	940	950	960	970	980	990
0	27.839	28.028	28.218	28.407	28.595	28.783	28.971	29.159	29.346	29.533
1	27.858	28.047	28.237	28.425	28.614	28.802	28.990	29.177	29.365	29.551
2	27.877	28.066	28.255	28.444	28.633	28.821	29.009	29.196	29.383	29.570
3	27.896	28.085	28.274	28.463	28.652	28.840	29.028	29.215	29.402	29.589
4	27.915	28.104	28.293	28.482	28.671	28.859	29.046	29.234	29.421	29.607
900F										
5	27.934	28.123	28.312	28.501	28.689	28.877	29.065	29.252	29.439	29.626
6	27.953	28.142	28.331	28.520	28.708	28.896	29.084	29.271	29.458	29.645
7	27.972	28.161	28.350	28.539	28.727	28.915	29.103	29.290	29.477	29.663
8	27.990	28.180	28.369	28.557	28.746	28.934	29.121	29.308	29.495	29.682
9	28.009	28.199	28.388	28.576	28.765	28.952	29.140	29.327	29.514	29.700

F	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090
0	29.719	29.905	30.091	30.276	30.461	30.646	30.830	31.014	31.197	31.380
1	29.738	29.924	30.109	30.295	30.479	30.664	30.848	31.032	31.216	31.399
2	29.756	29.942	30.128	30.313	30.498	30.682	30.867	31.050	31.234	31.417
3	29.775	29.961	30.146	30.332	30.516	30.701	30.885	31.069	31.252	31.435
4	29.793	29.979	30.165	30.350	30.535	30.719	30.903	31.087	31.271	31.454
1000F										
5	29.812	29.998	30.183	30.369	30.553	30.738	30.922	31.106	31.289	31.472
6	29.831	30.017	30.202	30.387	30.572	30.756	30.940	31.124	31.307	31.490
7	29.849	30.035	30.221	30.406	30.590	30.775	30.959	31.142	31.325	31.508
8	29.868	30.054	30.239	30.424	30.609	30.793	30.977	31.161	31.344	31.527
9	29.886	30.072	30.258	30.443	30.627	30.811	30.995	31.179	31.362	31.545

F	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190
0	31.563	31.746	31.928	32.109	32.291	32.472	32.652	32.833	33.012	33.192
1	31.581	31.764	31.946	32.128	32.309	32.490	32.670	32.851	33.030	33.210
2	31.600	31.782	31.964	32.146	32.327	32.508	32.688	32.869	33.048	33.228
3	31.618	31.800	31.982	32.164	32.345	32.526	32.706	32.887	33.066	33.246
4	31.636	31.818	32.000	32.182	32.363	32.544	32.724	32.905	33.084	33.264
1100F										
5	31.654	31.837	32.019	32.200	32.381	32.562	32.742	32.923	33.102	33.282
6	31.673	31.855	32.037	32.218	32.399	32.580	32.761	32.941	33.120	33.300
7	31.691	31.873	32.055	32.236	32.417	32.598	32.779	32.959	33.138	33.317
8	31.709	31.891	32.073	32.254	32.436	32.616	32.797	32.977	33.156	33.335
9	31.727	31.909	32.091	32.273	32.454	32.634	32.815	32.995	33.174	33.353

1200F	33.371

TABLE II - CELSIUS SCALE
CLASS Q □□□□--C DETECTORS (10 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

-200C	1.698									
C	-190	-180	-170	-160	-150	-140	-130	-120	-110	-100
0	2.137	2.572	3.004	3.433	3.859	4.282	4.703	5.121	5.537	5.951
-1	2.093	2.529	2.961	3.391	3.817	4.240	4.661	5.080	5.496	5.910
-2	2.050	2.486	2.918	3.348	3.774	4.198	4.619	5.038	5.454	5.869
-3	2.006	2.442	2.875	3.305	3.732	4.156	4.577	4.996	5.413	5.827
-4	1.962	2.399	2.832	3.262	3.689	4.114	4.535	4.954	5.371	5.786
100C										
-5	1.918	2.355	2.789	3.219	3.647	4.071	4.493	4.912	5.330	5.745
-6	1.874	2.312	2.746	3.176	3.604	4.029	4.451	4.871	5.288	5.703
-7	1.830	2.268	2.702	3.133	3.561	3.987	4.409	4.829	5.246	5.662
-8	1.786	2.225	2.659	3.090	3.519	3.944	4.367	4.787	5.205	5.620
-9	1.742	2.181	2.616	3.048	3.476	3.902	4.325	4.745	5.163	5.579

C	-90	-80	-70	-60	-50	-40	-30	-20	-10	0
0	6.363	6.773	7.182	7.589	7.994	8.398	8.800	9.201	9.601	10.000
-1	6.322	6.732	7.141	7.548	7.953	8.357	8.760	9.161	9.561	9.960
-2	6.281	6.691	7.100	7.507	7.913	8.317	8.720	9.121	9.521	9.920
-3	6.240	6.650	7.059	7.467	7.872	8.277	8.680	9.081	9.481	9.881
-4	6.199	6.609	7.019	7.426	7.832	8.236	8.639	9.041	9.441	9.841
0C										
-5	6.157	6.568	6.978	7.385	7.791	8.196	8.599	9.001	9.401	9.801
-6	6.116	6.527	6.937	7.345	7.751	8.155	8.559	8.961	9.361	9.761
-7	6.075	6.486	6.896	7.304	7.710	8.115	8.519	8.921	9.321	9.721
-8	6.034	6.445	6.855	7.263	7.670	8.075	8.478	8.880	9.281	9.681
-9	5.993	6.404	6.814	7.222	7.629	8.034	8.438	8.840	9.241	9.641

C	0	10	20	30	40	50	60	70	80	90
0	10.000	10.398	10.794	11.189	11.583	11.976	12.368	12.758	13.148	13.536
1	10.040	10.437	10.834	11.229	11.623	12.015	12.407	12.797	13.187	13.575
2	10.080	10.477	10.873	11.268	11.662	12.055	12.446	12.836	13.225	13.613
3	10.119	10.517	10.913	11.308	11.701	12.094	12.485	12.875	13.264	13.652
4	10.159	10.556	10.952	11.347	11.741	12.133	12.524	12.914	13.303	13.691
0C										
5	10.199	10.596	10.992	11.386	11.780	12.172	12.563	12.953	13.342	13.730
6	10.239	10.636	11.031	11.426	11.819	12.211	12.602	12.992	13.381	13.768
7	10.278	10.675	11.071	11.465	11.858	12.250	12.641	13.031	13.420	13.807
8	10.318	10.715	11.110	11.505	11.898	12.290	12.680	13.070	13.458	13.846
9	10.358	10.754	11.150	11.544	11.937	12.329	12.719	13.109	13.497	13.884

C	100	110	120	130	140	150	160	170	180	190
0	13.923	14.309	14.694	15.077	15.459	15.841	16.221	16.599	16.977	17.354
1	13.962	14.347	14.732	15.115	15.498	15.879	16.259	16.637	17.015	17.391
2	14.000	14.386	14.770	15.154	15.536	15.917	16.296	16.675	17.052	17.429
3	14.039	14.424	14.809	15.192	15.574	15.955	16.334	16.713	17.090	17.466
4	14.077	14.463	14.847	15.230	15.612	15.993	16.372	16.751	17.128	17.504
100C										
5	14.116	14.501	14.885	15.268	15.650	16.031	16.410	16.788	17.165	17.541
6	14.155	14.540	14.924	15.307	15.688	16.069	16.448	16.826	17.203	17.579
7	14.193	14.578	14.962	15.345	15.726	16.107	16.486	16.864	17.241	17.616
8	14.232	14.617	15.000	15.383	15.764	16.145	16.524	16.902	17.278	17.654
9	14.270	14.655	15.039	15.421	15.803	16.183	16.562	16.939	17.316	17.691

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TABLE II - CELSIUS SCALE (Continued)
CLASS Q □□□□—C DETECTORS (10 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

C	200	210	220	230	240	250	260	270	280	290
0	17.729	18.103	18.476	18.848	19.219	19.588	19.956	20.323	20.689	21.054
1	17.766	18.140	18.513	18.885	19.256	19.625	19.993	20.360	20.726	21.091
2	17.804	18.178	18.551	18.922	19.293	19.662	20.030	20.397	20.762	21.127
3	17.841	18.215	18.588	18.959	19.329	19.699	20.067	20.433	20.799	21.163
4	17.879	18.252	18.625	18.996	19.366	19.735	20.103	20.470	20.835	21.200
200C										
5	17.916	18.290	18.662	19.033	19.403	19.772	20.140	20.507	20.872	21.236
6	17.954	18.327	18.699	19.070	19.440	19.809	20.177	20.543	20.908	21.272
7	17.991	18.364	18.736	19.107	19.477	19.846	20.213	20.580	20.945	21.309
8	18.028	18.402	18.774	19.144	19.514	19.883	20.250	20.616	20.981	21.345
9	18.066	18.439	18.811	19.182	19.551	19.920	20.287	20.653	21.018	21.381

C	300	310	320	330	340	350	360	370	380	390
0	21.418	21.780	22.142	22.502	22.861	23.218	23.575	23.930	24.285	24.638
1	21.454	21.816	22.178	22.538	22.896	23.254	23.611	23.966	24.320	24.673
2	21.490	21.853	22.214	22.574	22.932	23.290	23.646	24.001	24.355	24.708
3	21.527	21.889	22.250	22.609	22.968	23.325	23.682	24.037	24.391	24.743
4	21.563	21.925	22.286	22.645	23.004	23.361	23.717	24.072	24.426	24.779
300C										
5	21.599	21.961	22.322	22.681	23.040	23.397	23.753	24.108	24.461	24.814
6	21.635	21.997	22.358	22.717	23.075	23.432	23.788	24.143	24.497	24.849
7	21.672	22.033	22.394	22.753	23.111	23.468	23.824	24.178	24.532	24.884
8	21.708	22.069	22.430	22.789	23.147	23.504	23.859	24.214	24.567	24.919
9	21.744	22.105	22.466	22.825	23.183	23.539	23.895	24.249	24.602	24.954

C	400	410	420	430	440	450	460	470	480	490
0	24.990	25.340	25.690	26.038	26.386	26.732	27.077	27.420	27.763	28.104
1	25.025	25.375	25.725	26.073	26.420	26.766	27.111	27.455	27.797	28.138
2	25.060	25.410	25.760	26.108	26.455	26.801	27.145	27.489	27.831	28.172
3	25.095	25.445	25.795	26.143	26.490	26.835	27.180	27.523	27.865	28.206
4	25.130	25.480	25.829	26.177	26.524	26.870	27.214	27.557	27.899	28.240
400C										
5	25.165	25.515	25.864	26.212	26.559	26.904	27.249	27.592	27.934	28.274
6	25.200	25.550	25.899	26.247	26.593	26.939	27.283	27.626	27.968	28.308
7	25.235	25.585	25.934	26.282	26.628	26.973	27.317	27.660	28.002	28.342
8	25.270	25.620	25.969	26.316	26.662	27.008	27.352	27.694	28.036	28.376
9	25.305	25.655	26.004	26.351	26.697	27.042	27.386	27.729	28.070	28.410

C	500	510	520	530	540	550	560	570	580	590
0	28.444	28.783	29.121	29.458	29.793	30.128	30.461	30.793	31.124	31.454
1	28.478	28.817	29.155	29.492	29.827	30.161	30.494	30.826	31.157	31.486
2	28.512	28.851	29.189	29.525	29.860	30.195	30.528	30.859	31.190	31.519
3	28.546	28.885	29.222	29.559	29.894	30.228	30.561	30.892	31.223	31.552
4	28.580	28.919	29.256	29.592	29.927	30.261	30.594	30.926	31.256	31.585
500C										
5	28.614	28.952	29.290	29.626	29.961	30.295	30.627	30.959	31.289	31.618
6	28.648	28.986	29.323	29.659	29.994	30.328	30.660	30.992	31.322	31.651
7	28.682	29.020	29.357	29.693	30.028	30.361	30.694	31.025	31.355	31.684
8	28.716	29.054	29.391	29.726	30.061	30.394	30.727	31.058	31.388	31.716
9	28.750	29.088	29.424	29.760	30.094	30.428	30.760	31.091	31.421	31.749

TABLE II - CELSIUS SCALE (Continued)
CLASS Q □□□□--C DETECTORS (10 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

C	600	610	620	630	640	650
0	31.782	32.109	32.436	32.761	33.084	33.407
1	31.815	32.142	32.468	32.793	33.117	33.439
2	31.848	32.175	32.501	32.825	33.149	33.471
3	31.880	32.207	32.533	32.858	33.181	33.504
4	31.913	32.240	32.566	32.890	33.214	33.536
600C						
5	31.946	32.273	32.598	32.923	33.246	33.568
6	31.979	32.305	32.631	32.955	33.278	33.600
7	32.011	32.338	32.663	32.987	33.310	33.632
8	32.044	32.370	32.696	33.020	33.343	33.664
9	32.077	32.403	32.728	33.052	33.375	33.696

TABLE III - FAHRENHEIT SCALE
CLASS Q □□□□--F DETECTORS (98.129 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F	-330	-320	-310	-300
0	16.185	18.584	20.972	23.349
-1	15.944	18.344	20.734	23.112
-2	15.703	18.105	20.495	22.875
-3	15.463	17.865	20.257	22.637
-4	15.222	17.625	20.018	22.400
-300F				
-5	14.981	17.386	19.779	22.162
-6	14.740	17.146	19.540	21.924
-7	14.498	16.906	19.301	21.686
-8	14.257	16.665	19.062	21.448
-9	14.015	16.425	18.823	21.210

F	-290	-280	-270	-260	-250	-240	-230	-220	-210	-200
0	25.716	28.073	30.420	32.758	35.087	37.408	39.719	42.023	44.319	46.608
-1	25.480	27.838	30.186	32.525	34.855	37.176	39.489	41.793	44.090	46.380
-2	25.244	27.603	29.952	32.292	34.622	36.944	39.258	41.563	43.861	46.151
-3	25.007	27.367	29.717	32.058	34.390	36.712	39.027	41.333	43.631	45.922
-4	24.771	27.132	29.483	31.824	34.157	36.480	38.796	41.103	43.402	45.694
-200F										
-5	24.534	26.896	29.248	31.591	33.924	36.249	38.565	40.872	43.172	45.465
-6	24.297	26.660	29.013	31.357	33.691	36.016	38.333	40.642	42.943	45.236
-7	24.060	26.424	28.778	31.123	33.458	35.784	38.102	40.411	42.713	45.007
-8	23.824	26.188	28.543	30.889	33.225	35.552	37.871	40.181	42.483	44.778
-9	23.586	25.952	28.308	30.655	32.992	35.320	37.639	39.950	42.253	44.549

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TABLE III - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--F DETECTORS (98.129 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F	-190	-180	-170	-160	-150	-140	-130	-120	-110	-100
0	48.890	51.164	53.432	55.693	57.949	60.198	62.441	64.679	66.912	69.139
-1	48.662	50.937	53.205	55.467	57.723	59.973	62.217	64.456	66.689	68.917
-2	48.434	50.710	52.979	55.242	57.498	59.748	61.993	64.232	66.466	68.694
-3	48.206	50.482	52.752	55.016	57.273	59.524	61.769	64.008	66.243	68.472
-4	47.978	50.255	52.526	54.789	57.047	59.299	61.545	63.785	66.019	68.249
-100F										
-5	47.750	50.028	52.299	54.563	56.822	59.074	61.320	63.561	65.796	68.026
-6	47.522	49.800	52.072	54.337	56.596	58.849	61.096	63.337	65.573	67.803
-7	47.293	49.573	51.845	54.111	56.370	58.624	60.871	63.113	65.350	67.581
-8	47.065	49.345	51.618	53.885	56.145	58.399	60.647	62.889	65.126	67.358
-9	46.837	49.117	51.391	53.658	55.919	58.174	60.422	62.665	64.903	67.135

F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0
0	71.362	73.579	75.793	78.001	80.205	82.405	84.601	86.793	88.981	91.165
-1	71.140	73.358	75.571	77.780	79.985	82.185	84.382	86.574	88.762	90.946
-2	70.918	73.136	75.350	77.560	79.765	81.965	84.162	86.355	88.543	90.728
-3	70.696	72.915	75.129	77.339	79.544	81.746	83.943	86.136	88.325	90.510
-4	70.473	72.693	74.908	77.118	79.324	81.526	83.723	85.917	88.106	90.292
0F										
-5	70.251	72.471	74.687	76.897	79.104	81.306	83.504	85.697	87.887	90.073
-6	70.029	72.249	74.465	76.676	78.883	81.086	83.284	85.478	87.668	89.855
-7	69.807	72.028	74.244	76.456	78.663	80.866	83.064	85.259	87.450	89.636
-8	69.584	71.806	74.022	76.235	78.442	80.646	82.845	85.040	87.231	89.418
-9	69.362	71.584	73.801	76.014	78.222	80.425	82.625	84.820	87.012	89.199

F	0	10	20	30	40	50	60	70	80	90
0	91.165	93.345	95.522	97.695	99.864	102.030	104.193	106.351	108.507	110.659
1	91.383	93.563	95.739	97.912	100.081	102.247	104.409	106.567	108.722	110.874
2	91.601	93.781	95.957	98.129	100.298	102.463	104.625	106.783	108.937	111.089
3	91.819	93.998	96.174	98.346	100.514	102.679	104.841	106.999	109.153	111.304
4	92.037	94.216	96.391	98.563	100.731	102.896	105.057	107.214	109.368	111.518
0F										
5	92.255	94.434	96.609	98.780	100.948	103.112	105.273	107.430	109.583	111.733
6	92.473	94.652	96.826	98.997	101.164	103.328	105.488	107.645	109.798	111.948
7	92.691	94.869	97.043	99.214	101.381	103.544	105.704	107.861	110.013	112.163
8	92.909	95.087	97.260	99.431	101.597	103.760	105.920	108.076	110.229	112.377
9	93.127	95.304	97.478	99.647	101.814	103.977	106.136	108.291	110.444	112.592

F	100	110	120	130	140	150	160	170	180	190
0	112.807	114.952	117.093	119.230	121.364	123.495	125.622	127.745	129.865	131.981
1	113.022	115.166	117.307	119.444	121.578	123.708	125.834	127.957	130.077	132.193
2	113.236	115.380	117.521	119.657	121.791	123.921	126.047	128.170	130.289	132.404
3	113.451	115.594	117.734	119.871	122.004	124.133	126.259	128.382	130.500	132.616
4	113.665	115.808	117.948	120.084	122.217	124.346	126.472	128.594	130.712	132.827
100F										
5	113.880	116.023	118.162	120.298	122.430	124.559	126.684	128.806	130.924	133.038
6	114.094	116.237	118.376	120.511	122.643	124.772	126.896	129.018	131.135	133.250
7	114.309	116.451	118.589	120.725	122.856	124.984	127.109	129.230	131.347	133.461
8	114.523	116.665	118.803	120.938	123.069	125.197	127.321	129.441	131.558	133.672
9	114.737	116.879	119.017	121.151	123.282	125.409	127.533	129.653	131.770	133.883

TABLE III - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--F DETECTORS (98.129 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

	F	200	210	220	230	240	250	260	270	280	290
	0	134.094	136.203	138.309	140.411	142.510	144.605	146.697	148.785	150.869	152.950
	1	134.305	136.414	138.520	140.621	142.720	144.814	146.905	148.993	151.077	153.158
	2	134.516	136.625	138.730	140.831	142.929	145.024	147.114	149.202	151.285	153.366
	3	134.727	136.836	138.940	141.041	143.139	145.233	147.323	149.410	151.494	153.573
	4	134.938	137.046	139.150	141.251	143.348	145.442	147.532	149.619	151.702	153.781
200F											
	5	135.149	137.257	139.361	141.461	143.558	145.651	147.741	149.827	151.910	153.989
	6	135.360	137.467	139.571	141.671	143.767	145.860	147.950	150.036	152.118	154.197
	7	135.571	137.678	139.781	141.881	143.977	146.069	148.158	150.244	152.326	154.404
	8	135.782	137.888	139.991	142.090	144.186	146.279	148.367	150.452	152.534	154.612
	9	135.993	138.099	140.201	142.300	144.396	146.488	148.576	150.661	152.742	154.820

	F	300	310	320	330	340	350	360	370	380	390
	0	155.027	157.101	159.171	161.238	163.301	165.361	167.417	169.469	171.518	173.564
	1	155.235	157.308	159.378	161.444	163.507	165.566	167.622	169.674	171.723	173.768
	2	155.442	157.515	159.585	161.651	163.713	165.772	167.827	169.879	171.928	173.972
	3	155.650	157.722	159.792	161.857	163.919	165.978	168.033	170.084	172.132	174.176
	4	155.857	157.929	159.998	162.063	164.125	166.183	168.238	170.289	172.337	174.381
300F											
	5	156.064	158.136	160.205	162.270	164.331	166.389	168.443	170.494	172.541	174.585
	6	156.272	158.343	160.412	162.476	164.537	166.595	168.649	170.699	172.746	174.789
	7	156.479	158.550	160.618	162.682	164.743	166.800	168.854	170.904	172.950	174.993
	8	156.686	158.757	160.825	162.889	164.949	167.006	169.059	171.109	173.155	175.197
	9	156.894	158.964	161.031	163.095	165.155	167.211	169.264	171.313	173.359	175.401

	F	400	410	420	430	440	450	460	470	480	490
	0	175.605	177.644	179.679	181.710	183.738	185.762	187.782	189.799	191.813	193.823
	1	175.809	177.847	179.882	181.913	183.940	185.964	187.984	190.001	192.014	194.024
	2	176.013	178.051	180.085	182.116	184.143	186.166	188.186	190.202	192.215	194.224
	3	176.217	178.255	180.288	182.318	184.345	186.368	188.388	190.404	192.416	194.425
	4	176.421	178.458	180.491	182.521	184.548	186.570	188.590	190.605	192.617	194.626
400F											
	5	176.625	178.662	180.695	182.724	184.750	186.772	188.791	190.806	192.818	194.826
	6	176.829	178.865	180.898	182.927	184.952	186.974	188.993	191.008	193.019	195.027
	7	177.033	179.068	181.101	183.130	185.155	187.176	189.195	191.209	193.220	195.228
	8	177.236	179.272	181.304	183.332	185.357	187.378	189.396	191.410	193.421	195.428
	9	177.440	179.475	181.507	183.535	185.559	187.580	189.598	191.612	193.622	195.629

	F	500	510	520	530	540	550	560	570	580	590
	0	195.829	197.832	199.831	201.827	203.819	205.808	207.793	209.775	211.753	213.727
	1	196.030	198.032	200.031	202.026	204.018	206.007	207.992	209.973	211.950	213.925
	2	196.230	198.232	200.231	202.226	204.217	206.205	208.190	210.171	212.148	214.122
	3	196.430	198.432	200.430	202.425	204.416	206.404	208.388	210.369	212.346	214.319
	4	196.631	198.632	200.630	202.624	204.615	206.602	208.586	210.566	212.543	214.516
500F											
	5	196.831	198.832	200.830	202.824	204.814	206.801	208.784	210.764	212.741	214.713
	6	197.031	199.032	201.029	203.023	205.013	207.000	208.983	210.962	212.938	214.910
	7	197.232	199.232	201.229	203.222	205.212	207.198	209.181	211.160	213.135	215.107
	8	197.432	199.432	201.428	203.421	205.411	207.396	209.379	211.358	213.333	215.304
	9	197.632	199.631	201.628	203.620	205.609	207.595	209.577	211.555	213.530	215.501

	F	600
	0	215.698

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TABLE IV - CELSIUS SCALE

CLASS Q □□□□--F DETECTORS (98.129 OHMS AT 0C)

Temperature vs Resistance Values in Ohms at 1C Intervals

C	-190	-180	-170	-160	-150	-140	-130	-120	-110	-100
0	20.972	25.244	29.483	33.691	37.871	42.023	46.151	50.255	54.337	58.399
-1	20.543	24.818	29.060	33.271	37.454	41.609	45.739	49.846	53.930	57.994
-2	20.113	24.392	28.637	32.852	37.037	41.195	45.327	49.436	53.522	57.588
-3	19.684	23.966	28.214	32.432	36.620	40.780	44.915	49.026	53.115	57.182
-4	19.254	23.539	27.791	32.011	36.202	40.365	44.503	48.616	52.707	56.777
-100C										
-5	18.823	23.112	27.367	31.591	35.784	39.950	44.090	48.206	52.299	56.370
-6	18.392	22.685	26.943	31.170	35.366	39.535	43.677	47.795	51.890	55.964
-7	17.961	22.257	26.519	30.748	34.948	39.119	43.264	47.385	51.482	55.558
-8	17.530	21.829	26.094	30.327	34.529	38.703	42.851	46.974	51.073	55.151
-9	17.098	21.401	25.669	29.905	34.110	38.287	42.437	46.562	50.664	54.744

C	-90	-80	-70	-60	-50	-40	-30	-20	-10	0
0	62.441	66.466	70.473	74.465	78.442	82.405	86.355	90.292	94.216	98.129
-1	62.038	66.064	70.073	74.067	78.045	82.009	85.960	89.898	93.824	97.738
-2	61.634	65.662	69.673	73.668	77.648	81.614	85.566	89.505	93.432	97.347
-3	61.230	65.260	69.273	73.269	77.251	81.218	85.171	89.112	93.040	96.956
-4	60.827	64.858	68.872	72.870	76.853	80.822	84.776	88.718	92.648	96.565
0C										
-5	60.422	64.456	68.472	72.471	76.456	80.425	84.382	88.325	92.255	96.174
-6	60.018	64.053	68.071	72.072	76.058	80.029	83.987	87.931	91.863	95.783
-7	59.614	63.650	67.670	71.673	75.660	79.633	83.591	87.537	91.470	95.391
-8	59.209	63.248	67.269	71.273	75.262	79.236	83.196	87.143	91.077	95.000
-9	58.804	62.844	66.867	70.873	74.864	78.839	82.801	86.749	90.685	94.608

C	0	10	20	30	40	50	60	70	80	90
0	98.129	102.030	105.920	109.798	113.665	117.521	121.364	125.197	129.018	132.827
1	98.520	102.420	106.308	110.186	114.051	117.905	121.748	125.579	129.399	133.207
2	98.910	102.809	106.697	110.573	114.437	118.290	122.132	125.962	129.780	133.588
3	99.301	103.198	107.085	110.960	114.823	118.675	122.515	126.344	130.162	133.968
4	99.691	103.588	107.473	111.346	115.209	119.059	122.899	126.726	130.543	134.348
0C										
5	100.081	103.977	107.861	111.733	115.594	119.444	123.282	127.109	130.924	134.727
6	100.471	104.365	108.248	112.120	115.980	119.828	123.665	127.491	131.305	135.107
7	100.861	104.754	108.636	112.506	116.365	120.212	124.048	127.873	131.685	135.487
8	101.251	105.143	109.024	112.893	116.750	120.597	124.431	128.254	132.066	135.866
9	101.641	105.532	109.411	113.279	117.136	120.980	124.814	128.636	132.447	136.246

C	100	110	120	130	140	150	160	170	180	190
0	136.625	140.411	144.186	147.950	151.702	155.442	159.171	162.889	166.595	170.289
1	137.004	140.789	144.563	148.325	152.076	155.816	159.543	163.260	166.965	170.658
2	137.383	141.167	144.940	148.701	152.451	156.189	159.916	163.631	167.334	171.027
3	137.762	141.545	145.316	149.077	152.825	156.562	160.288	164.002	167.704	171.395
4	138.141	141.923	145.693	149.452	153.199	156.935	160.660	164.372	168.074	171.764
100C										
5	138.520	142.300	146.069	149.827	153.573	157.308	161.031	164.743	168.443	172.132
6	138.898	142.678	146.446	150.202	153.947	157.681	161.403	165.114	168.813	172.500
7	139.277	143.055	146.822	150.577	154.321	158.054	161.775	165.484	169.182	172.868
8	139.655	143.432	147.198	150.952	154.695	158.426	162.146	165.854	169.551	173.237
9	140.033	143.809	147.574	151.327	155.069	158.799	162.517	166.225	169.920	173.604

TABLE IV - CELSIUS SCALE (Continued)
CLASS Q □□□□--F DETECTORS (98.129 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

C	200	210	220	230	240	250	260	270	280	290
0	173.972	177.644	181.304	184.952	188.590	192.215	195.829	199.432	203.023	206.603
1	174.340	178.010	181.669	185.317	188.953	192.577	196.190	199.792	203.381	206.960
2	174.707	178.377	182.034	185.681	189.316	192.939	196.551	200.151	203.740	207.317
3	175.075	178.743	182.400	186.045	189.678	193.300	196.911	200.510	204.098	207.674
4	175.442	179.109	182.765	186.409	190.041	193.662	197.272	200.870	204.456	208.031
200C										
5	175.809	179.475	183.130	186.772	190.404	194.024	197.632	201.229	204.814	208.388
6	176.177	179.841	183.494	187.136	190.766	194.385	197.992	201.588	205.172	208.745
7	176.543	180.207	183.859	187.500	191.129	194.746	198.352	201.947	205.530	209.101
8	176.910	180.573	184.224	187.863	191.491	195.107	198.712	202.306	205.888	209.458
9	177.277	180.938	184.588	188.226	191.853	195.468	199.072	202.664	206.245	209.814

C	300	310
0	210.171	213.727
1	210.527	214.082
2	210.883	214.437
3	211.239	214.792
4	211.595	215.147
300C		
5	211.950	215.501
6	212.306	215.856
7	212.662	
8	213.017	
9	213.372	

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TABLE V - FAHRENHEIT SCALE
CLASS Q □□□□ --B DETECTORS (32 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F										
							-330	-320	-310	-300
0							5.278	6.060	6.839	7.614
-1							5.199	5.982	6.761	7.537
-2							5.121	5.904	6.684	7.459
-3							5.042	5.826	6.606	7.382
-4							4.964	5.748	6.528	7.305
-300F										
-5							4.885	5.669	6.450	7.227
-6							4.807	5.591	6.372	7.149
-7							4.728	5.513	6.294	7.072
-8							4.649	5.435	6.216	6.994
-9							4.570	5.356	6.138	6.917
F	-290	-280	-270	-260	-250	-240	-230	-220	-210	-200
0	8.386	9.155	9.920	10.683	11.442	12.199	12.953	13.704	14.453	15.199
-1	8.309	9.078	9.844	10.606	11.366	12.123	12.877	13.629	14.378	15.124
-2	8.232	9.001	9.767	10.530	11.290	12.048	12.802	13.554	14.303	15.050
-3	8.155	8.924	9.691	10.454	11.214	11.972	12.727	13.479	14.228	14.975
-4	8.078	8.848	9.614	10.378	11.139	11.896	12.651	13.404	14.153	14.901
-200F										
-5	8.001	8.771	9.538	10.302	11.063	11.821	12.576	13.329	14.079	14.826
-6	7.923	8.694	9.461	10.225	10.987	11.745	12.501	13.253	14.004	14.751
-7	7.846	8.617	9.385	10.149	10.911	11.669	12.425	13.178	13.929	14.677
-8	7.769	8.540	9.308	10.073	10.835	11.594	12.350	13.103	13.854	14.602
-9	7.692	8.463	9.231	9.997	10.759	11.518	12.274	13.028	13.779	14.527
F	-190	-180	-170	-160	-150	-140	-130	-120	-110	-100
0	15.943	16.685	17.424	18.162	18.897	19.631	20.362	21.092	21.820	22.546
-1	15.869	16.611	17.350	18.088	18.824	19.557	20.289	21.019	21.747	22.474
-2	15.794	16.536	17.276	18.014	18.750	19.484	20.216	20.946	21.675	22.401
-3	15.720	16.462	17.203	17.941	18.677	19.411	20.143	20.873	21.602	22.329
-4	15.646	16.388	17.129	17.867	18.603	19.337	20.070	20.800	21.529	22.256
-100F										
-5	15.571	16.314	17.055	17.793	18.530	19.264	19.997	20.727	21.456	22.183
-6	15.497	16.240	16.981	17.719	18.456	19.191	19.923	20.654	21.383	22.111
-7	15.422	16.166	16.907	17.646	18.382	19.117	19.850	20.581	21.311	22.038
-8	15.348	16.091	16.833	17.572	18.309	19.044	19.777	20.508	21.238	21.965
-9	15.273	16.017	16.759	17.498	18.235	18.971	19.704	20.435	21.165	21.893
F	-90	-80	-70	-60	-50	-40	-30	-20	-10	0
0	23.271	23.994	24.716	25.436	26.155	26.872	27.588	28.303	29.017	29.729
-1	23.199	23.922	24.644	25.364	26.083	26.801	27.517	28.232	28.945	29.658
-2	23.126	23.850	24.572	25.292	26.011	26.729	27.445	28.160	28.874	29.587
-3	23.054	23.778	24.500	25.220	25.940	26.657	27.374	28.089	28.803	29.515
-4	22.981	23.705	24.428	25.148	25.868	26.586	27.302	28.017	28.731	29.444
0F										
-5	22.909	23.633	24.355	25.076	25.796	26.514	27.231	27.946	28.660	29.373
-6	22.837	23.561	24.283	25.004	25.724	26.442	27.159	27.875	28.589	29.302
-7	22.764	23.488	24.211	24.932	25.652	26.370	27.087	27.803	28.517	29.230
-8	22.691	23.416	24.139	24.860	25.580	26.299	27.016	27.732	28.446	29.159
-9	22.619	23.344	24.067	24.788	25.508	26.227	26.944	27.660	28.375	29.088

TABLE V - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--B DETECTORS (32 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F	0	10	20	30	40	50	60	70	80	90
0	29.729	30.440	31.150	31.858	32.566	33.272	33.977	34.681	35.384	36.086
1	29.800	30.511	31.221	31.929	32.637	33.343	34.048	34.752	35.454	36.156
2	29.871	30.582	31.292	32.000	32.707	33.413	34.118	34.822	35.525	36.226
3	29.942	30.653	31.362	32.071	32.778	33.484	34.189	34.892	35.595	36.296
4	30.013	30.724	31.433	32.142	32.849	33.554	34.259	34.963	35.665	36.366
0F										
5	30.085	30.795	31.504	32.212	32.919	33.625	34.330	35.033	35.735	36.436
6	30.156	30.866	31.575	32.283	32.990	33.695	34.400	35.103	35.805	36.506
7	30.227	30.937	31.646	32.354	33.060	33.766	34.470	35.173	35.876	36.576
8	30.298	31.008	31.717	32.424	33.131	33.836	34.541	35.244	35.946	36.646
9	30.369	31.079	31.788	32.495	33.202	33.907	34.611	35.314	36.016	36.716

F	100	110	120	130	140	150	160	170	180	190
0	36.786	37.486	38.184	38.881	39.577	40.272	40.965	41.658	42.349	43.039
1	36.856	37.556	38.254	38.951	39.647	40.341	41.035	41.727	42.418	43.108
2	36.926	37.626	38.324	39.020	39.716	40.411	41.104	41.796	42.487	43.177
3	36.996	37.695	38.393	39.090	39.786	40.480	41.173	41.865	42.556	43.246
4	37.066	37.765	38.463	39.160	39.855	40.549	41.243	41.935	42.625	43.315
100F										
5	37.136	37.835	38.533	39.229	39.925	40.619	41.312	42.004	42.694	43.384
6	37.206	37.905	38.602	39.299	39.994	40.688	41.381	42.073	42.763	43.453
7	37.276	37.975	38.672	39.368	40.064	40.758	41.450	42.142	42.832	43.522
8	37.346	38.045	38.742	39.438	40.133	40.827	41.520	42.211	42.901	43.591
9	37.416	38.114	38.812	39.508	40.202	40.896	41.589	42.280	42.970	43.659

F	200	210	220	230	240	250	260	270	280	290
0	43.728	44.416	45.103	45.788	46.473	47.156	47.838	48.519	49.199	49.877
1	43.797	44.485	45.171	45.857	46.541	47.224	47.906	48.587	49.266	49.945
2	43.866	44.554	45.240	45.925	46.609	47.292	47.974	48.655	49.334	50.013
3	43.935	44.622	45.309	45.994	46.678	47.361	48.042	48.723	49.402	50.080
4	44.004	44.691	45.377	46.062	46.746	47.429	48.110	48.791	49.470	50.148
200F										
5	44.072	44.760	45.446	46.131	46.814	47.497	48.179	48.859	49.538	50.216
6	44.141	44.828	45.514	46.199	46.883	47.565	48.247	48.927	49.606	50.284
7	44.210	44.897	45.583	46.268	46.951	47.633	48.315	48.995	49.674	50.351
8	44.279	44.966	45.651	46.336	47.019	47.702	48.383	49.063	49.742	50.419
9	44.347	45.034	45.720	46.404	47.088	47.770	48.451	49.131	49.809	50.487

F	300	310	320	330	340	350	360	370	380	390
0	50.555	51.231	51.906	52.580	53.253	53.924	54.595	55.264	55.932	56.599
1	50.622	51.298	51.973	52.647	53.320	53.991	54.662	55.331	55.999	56.666
2	50.690	51.366	52.041	52.715	53.387	54.059	54.729	55.398	56.066	56.733
3	50.758	51.433	52.108	52.782	53.454	54.126	54.796	55.465	56.133	56.799
4	50.825	51.501	52.176	52.849	53.521	54.193	54.863	55.532	56.199	56.866
300F										
5	50.893	51.569	52.243	52.916	53.589	54.260	54.930	55.598	56.266	56.932
6	50.960	51.636	52.310	52.984	53.656	54.327	54.997	55.665	56.333	56.999
7	51.028	51.704	52.378	53.051	53.723	54.394	55.063	55.732	56.399	57.066
8	51.096	51.771	52.445	53.118	53.790	54.461	55.130	55.799	56.466	57.132
9	51.163	51.838	52.513	53.185	53.857	54.528	55.197	55.866	56.533	57.199

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TABLE V - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--B DETECTORS (32 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

	F	400	410	420	430	440	450	460	470	480	490
	0	57.265	57.930	58.593	59.256	59.917	60.577	61.236	61.894	62.550	63.206
	1	57.332	57.996	58.660	59.322	59.983	60.643	61.302	61.960	62.616	63.271
	2	57.398	58.063	58.726	59.388	60.049	60.709	61.368	62.025	62.682	63.337
	3	57.465	58.129	58.792	59.454	60.115	60.775	61.434	62.091	62.747	63.402
	4	57.531	58.195	58.859	59.520	60.181	60.841	61.499	62.157	62.813	63.468
400F											
	5	57.598	58.262	58.925	59.587	60.247	60.907	61.565	62.222	62.878	63.533
	6	57.664	58.328	58.991	59.653	60.313	60.973	61.631	62.288	62.944	63.599
	7	57.731	58.394	59.057	59.719	60.379	61.038	61.697	62.354	63.009	63.664
	8	57.797	58.461	59.123	59.785	60.445	61.104	61.762	62.419	63.075	63.729
	9	57.863	58.527	59.190	59.851	60.511	61.170	61.828	62.485	63.140	63.795

	F	500	510	520	530	540	550	560	570	580	590
	0	63.860	64.513	65.165	65.816	66.466	67.114	67.762	68.408	69.053	69.697
	1	63.926	64.579	65.230	65.881	66.531	67.179	67.826	68.472	69.117	69.761
	2	63.991	64.644	65.296	65.946	66.596	67.244	67.891	68.537	69.182	69.825
	3	64.056	64.709	65.361	66.011	66.660	67.309	67.956	68.601	69.246	69.890
	4	64.122	64.774	65.426	66.076	66.725	67.373	68.020	68.666	69.311	69.954
500F											
	5	64.187	64.839	65.491	66.141	66.790	67.438	68.085	68.730	69.375	70.018
	6	64.252	64.905	65.556	66.206	66.855	67.503	68.150	68.795	69.439	70.083
	7	64.317	64.970	65.621	66.271	66.920	67.568	68.214	68.859	69.504	70.147
	8	64.383	65.035	65.686	66.336	66.985	67.632	68.279	68.924	69.568	70.211
	9	64.448	65.100	65.751	66.401	67.049	67.697	68.343	68.988	69.632	70.275

	F	600	610	620	630	640	650	660	670	680	690
	0	70.340	70.981	71.622	72.261	72.899	73.536	74.172	74.806	75.440	76.072
	1	70.404	71.045	71.686	72.325	72.963	73.599	74.235	74.870	75.503	76.135
	2	70.468	71.109	71.749	72.389	73.026	73.663	74.299	74.933	75.566	76.198
	3	70.532	71.173	71.813	72.452	73.090	73.727	74.362	74.996	75.630	76.262
	4	70.596	71.237	71.877	72.516	73.154	73.790	74.426	75.060	75.693	76.325
600F											
	5	70.660	71.301	71.941	72.580	73.218	73.854	74.489	75.123	75.756	76.388
	6	70.725	71.366	72.005	72.644	73.281	73.917	74.553	75.187	75.819	76.451
	7	70.789	71.430	72.069	72.708	73.345	73.981	74.616	75.250	75.883	76.514
	8	70.853	71.494	72.133	72.771	73.409	74.045	74.679	75.313	75.946	76.577
	9	70.917	71.558	72.197	72.835	73.472	74.108	74.743	75.376	76.009	76.640

	F	700	710	720	730	740	750	760	770	780	790
	0	76.703	77.333	77.962	78.590	79.216	79.842	80.466	81.089	81.711	82.332
	1	76.766	77.396	78.025	78.653	79.279	79.904	80.528	81.151	81.773	82.394
	2	76.829	77.459	78.088	78.715	79.342	79.967	80.591	81.214	81.835	82.456
	3	76.892	77.522	78.151	78.778	79.404	80.029	80.653	81.276	81.897	82.518
	4	76.955	77.585	78.213	78.841	79.467	80.092	80.715	81.338	81.960	82.580
700F											
	5	77.018	77.648	78.276	78.903	79.529	80.154	80.778	81.400	82.022	82.642
	6	77.081	77.711	78.339	78.966	79.592	80.216	80.840	81.462	82.084	82.704
	7	77.144	77.774	78.402	79.029	79.654	80.279	80.902	81.525	82.146	82.766
	8	77.207	77.836	78.464	79.091	79.717	80.341	80.965	81.587	82.208	82.828
	9	77.270	77.899	78.527	79.154	79.779	80.404	81.027	81.649	82.270	82.890

TABLE V - FAHRENHEIT SCALE (Continued)
CLASS Q □□□□--B DETECTORS (32 OHMS AT 32F)
Temperature vs Resistance Values in Ohms at 1F Intervals

F	800	810	820	830	840	850	860	870	880	890
0	82.951	83.570	84.187	84.803	85.418	86.032	86.645	87.256	87.867	88.476
1	83.013	83.632	84.249	84.865	85.480	86.093	86.706	87.317	87.928	88.537
2	83.075	83.693	84.311	84.926	85.541	86.155	86.767	87.379	87.989	88.598
3	83.137	83.755	84.372	84.988	85.603	86.216	86.828	87.440	88.050	88.658
4	83.199	83.817	84.434	85.049	85.664	86.277	86.890	87.501	88.111	88.719
800F										
5	83.261	83.879	84.495	85.111	85.725	86.339	86.951	87.562	88.171	88.780
6	83.323	83.940	84.557	85.172	85.787	86.400	87.012	87.623	88.232	88.841
7	83.384	84.002	84.619	85.234	85.848	86.461	87.073	87.684	88.293	88.902
8	83.446	84.064	84.680	85.295	85.909	86.522	87.134	87.745	88.354	88.962
9	83.508	84.126	84.742	85.357	85.971	86.584	87.195	87.806	88.415	89.023

F	900	910	920	930	940	950	960	970	980	990
0	89.084	89.691	90.297	90.901	91.505	92.107	92.708	93.308	93.907	94.504
1	89.145	89.751	90.357	90.962	91.565	92.167	92.768	93.368	93.967	94.564
2	89.205	89.812	90.418	91.022	91.625	92.227	92.828	93.428	94.026	94.624
3	89.266	89.873	90.478	91.082	91.685	92.287	92.888	93.488	94.086	94.683
4	89.327	89.933	90.539	91.143	91.746	92.347	92.948	93.548	94.146	94.743
900F										
5	89.388	89.994	90.599	91.203	91.806	92.408	93.008	93.607	94.206	94.803
6	89.448	90.054	90.659	91.263	91.866	92.468	93.068	93.667	94.265	94.862
7	89.509	90.115	90.720	91.324	91.926	92.528	93.128	93.727	94.325	94.922
8	89.570	90.176	90.780	91.384	91.987	92.588	93.188	93.787	94.385	94.982
9	89.630	90.236	90.841	91.444	92.047	92.648	93.248	93.847	94.445	95.041

F	1000	1010	1020	1030	1040	1050	1060	1070	1080	1090
0	95.101	95.696	96.290	96.883	97.475	98.066	98.656	99.244	99.831	100.417
1	95.160	95.756	96.350	96.943	97.534	98.125	98.714	99.303	99.890	100.476
2	95.220	95.815	96.409	97.002	97.593	98.184	98.773	99.361	99.948	100.534
3	95.280	95.875	96.468	97.061	97.653	98.243	98.832	99.420	100.007	100.593
4	95.339	95.934	96.528	97.120	97.712	98.302	98.891	99.479	100.066	100.651
1000F										
5	95.399	95.993	96.587	97.179	97.771	98.361	98.950	99.538	100.124	100.710
6	95.458	96.053	96.646	97.239	97.830	98.420	99.009	99.596	100.183	100.768
7	95.518	96.112	96.706	97.298	97.889	98.479	99.068	99.655	100.242	100.827
8	95.577	96.172	96.765	97.357	97.948	98.538	99.126	99.714	100.300	100.885
9	95.637	96.231	96.824	97.416	98.007	98.597	99.185	99.772	100.359	100.944

F	1100	1110	1120	1130	1140	1150	1160	1170	1180	1190
0	101.002	101.586	102.169	102.750	103.330	103.909	104.487	105.064	105.640	106.214
1	101.061	101.644	102.227	102.808	103.388	103.967	104.545	105.122	105.697	106.272
2	101.119	101.703	102.285	102.866	103.446	104.025	104.603	105.180	105.755	106.329
3	101.177	101.761	102.343	102.924	103.504	104.083	104.661	105.237	105.812	106.387
4	101.236	101.819	102.401	102.982	103.562	104.141	104.718	105.295	105.870	106.444
1100F										
5	101.294	101.877	102.459	103.040	103.620	104.199	104.776	105.352	105.927	106.501
6	101.353	101.936	102.518	103.098	103.678	104.256	104.834	105.410	105.985	106.559
7	101.411	101.994	102.576	103.156	103.736	104.314	104.891	105.467	106.042	106.616
8	101.469	102.052	102.634	103.214	103.794	104.372	104.949	105.525	106.100	106.673
9	101.528	102.110	102.692	103.272	103.852	104.430	105.007	105.582	106.157	106.731

1200F	106.788

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TABLE VI - CELSIUS SCALE
CLASS Q □□□□--B DETECTORS (32 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

-200C	5.435									
C	-190	-180	-170	-160	-150	-140	-130	-120	-110	-100
0	6.839	8.232	9.614	10.987	12.350	13.704	15.050	16.388	17.719	19.044
-1	6.699	8.093	9.477	10.850	12.214	13.569	14.916	16.255	17.587	18.912
-2	6.559	7.954	9.339	10.713	12.078	13.434	14.781	16.121	17.454	18.780
-3	6.419	7.815	9.201	10.576	11.942	13.298	14.647	15.988	17.321	18.647
-4	6.279	7.676	9.063	10.439	11.806	13.163	14.512	15.854	17.188	18.515
-100C										
-5	6.138	7.537	8.924	10.302	11.669	13.028	14.378	15.720	17.055	18.382
-6	5.998	7.398	8.786	10.164	11.533	12.892	14.243	15.586	16.922	18.250
-7	5.857	7.258	8.648	10.027	11.397	12.757	14.109	15.452	16.788	18.117
-8	5.716	7.118	8.509	9.890	11.260	12.621	13.974	15.318	16.655	17.985
-9	5.576	6.979	8.371	9.752	11.123	12.485	13.839	15.184	16.522	17.852

C	-90	-80	-70	-60	-50	-40	-30	-20	-10	0
0	20.362	21.675	22.981	24.283	25.580	26.872	28.160	29.444	30.724	32.000
-1	20.231	21.544	22.851	24.153	25.451	26.743	28.032	29.316	30.596	31.873
-2	20.099	21.413	22.721	24.023	25.321	26.614	27.903	29.188	30.468	31.745
-3	19.967	21.281	22.590	23.893	25.192	26.485	27.774	29.059	30.340	31.618
-4	19.836	21.150	22.459	23.763	25.062	26.356	27.646	28.931	30.213	31.490
0C										
-5	19.704	21.019	22.329	23.633	24.932	26.227	27.517	28.803	30.085	31.362
-6	19.572	20.888	22.198	23.503	24.803	26.098	27.388	28.674	29.957	31.235
-7	19.440	20.756	22.067	23.373	24.673	25.968	27.259	28.546	29.829	31.107
-8	19.308	20.625	21.936	23.242	24.543	25.839	27.130	28.417	29.700	30.980
-9	19.176	20.494	21.805	23.112	24.413	25.710	27.001	28.289	29.572	30.852

C	0	10	20	30	40	50	60	70	80	90
0	32.000	33.272	34.541	35.805	37.066	38.324	39.577	40.827	42.073	43.315
1	32.127	33.399	34.667	35.932	37.192	38.449	39.702	40.952	42.197	43.439
2	32.255	33.526	34.794	36.058	37.318	38.575	39.827	41.076	42.322	43.563
3	32.382	33.653	34.920	36.184	37.444	38.700	39.952	41.201	42.446	43.687
4	32.509	33.780	35.047	36.310	37.570	38.825	40.077	41.326	42.570	43.811
0C										
5	32.637	33.907	35.173	36.436	37.695	38.951	40.202	41.450	42.694	43.935
6	32.764	34.034	35.300	36.562	37.821	39.076	40.327	41.575	42.819	44.059
7	32.891	34.161	35.426	36.688.	37.947	39.201	40.452	41.699	42.943	44.182
8	33.018	34.287	35.553	36.814	38.072	39.327	40.577	41.824	43.067	44.306
9	33.145	34.414	35.679	36.940	38.198	39.452	40.702	41.948	43.191	44.430

C	100	110	120	130	140	150	160	170	180	190
0	44.554	45.788	47.019	48.247	49.470	50.690	51.906	53.118	54.327	55.532
1	44.677	45.912	47.142	48.369	49.592	50.812	52.027	53.239	54.447	55.652
2	44.801	46.035	47.265	48.492	49.714	50.933	52.149	53.360	54.568	55.772
3	44.924	46.158	47.388	48.614	49.836	51.055	52.270	53.481	54.689	55.892
4	45.048	46.281	47.511	48.736	49.958	51.177	52.391	53.602	54.809	56.012
100C										
5	45.171	46.404	47.633	48.859	50.080	51.298	52.513	53.723	54.930	56.133
6	45.295	46.527	47.756	48.981	50.202	51.420	52.634	53.844	55.050	56.253
7	45.418	46.650	47.879	49.103	50.324	51.542	52.755	53.965	55.171	56.373
8	45.542	46.773	48.001	49.226	50.446	51.663	52.876	54.085	55.291	56.493
9	45.665	46.896	48.124	49.348	50.568	51.784	52.997	54.206	55.411	56.613

TABLE VI - CELSIUS SCALE (Continued)
CLASS Q □□□□--B DETECTORS (32 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

	C	200	210	220	230	240	250	260	270	280	290
	0	56.733	57.930	59.123	60.313	61.499	62.682	63.860	65.035	66.206	67.373
	1	56.852	58.049	59.243	60.432	61.618	62.800	63.978	65.152	66.323	67.490
	2	56.972	58.169	59.362	60.551	61.736	62.918	64.095	65.270	66.440	67.606
	3	57.092	58.288	59.481	60.669	61.854	63.036	64.213	65.387	66.557	67.723
	4	57.212	58.408	59.600	60.788	61.973	63.153	64.331	65.504	66.673	67.839
200C											
	5	57.332	58.527	59.719	60.907	62.091	63.271	64.448	65.621	66.790	67.956
	6	57.451	58.646	59.838	61.025	62.209	63.389	64.565	65.738	66.907	68.072
	7	57.571	58.766	59.957	61.144	62.327	63.507	64.683	65.855	67.024	68.188
	8	57.691	58.885	60.076	61.262	62.445	63.625	64.800	65.972	67.140	68.305
	9	57.810	59.004	60.194	61.381	62.564	63.742	64.918	66.089	67.257	68.421

	C	300	310	320	330	340	350	360	370	380	390
	0	68.537	69.697	70.853	72.005	73.154	74.299	75.440	76.577	77.711	78.841
	1	68.653	69.813	70.968	72.120	73.268	74.413	75.554	76.691	77.824	78.953
	2	68.769	69.928	71.084	72.235	73.383	74.527	75.668	76.804	77.937	79.066
	3	68.885	70.044	71.199	72.350	73.498	74.641	75.781	76.918	78.050	79.179
	4	69.001	70.160	71.314	72.465	73.612	74.756	75.895	77.031	78.163	79.292
300C											
	5	69.117	70.275	71.430	72.580	73.727	74.870	76.009	77.144	78.276	79.404
	6	69.233	70.391	71.545	72.695	73.841	74.984	76.123	77.258	78.389	79.517
	7	69.349	70.506	71.660	72.810	73.956	75.098	76.236	77.371	78.502	79.629
	8	69.465	70.622	71.775	72.924	74.070	75.212	76.350	77.484	78.615	79.742
	9	69.581	70.737	71.890	73.039	74.184	75.326	76.464	77.598	78.728	79.854

	C	400	410	420	430	440	450	460	470	480	490
	0	79.967	81.089	82.208	83.323	84.434	85.541	86.645	87.745	88.841	89.933
	1	80.079	81.201	82.319	83.434	84.545	85.652	86.755	87.855	88.950	90.042
	2	80.192	81.313	82.431	83.545	84.656	85.762	86.865	87.964	89.060	90.151
	3	80.304	81.425	82.543	83.656	84.766	85.873	86.975	88.074	89.169	90.260
	4	80.416	81.537	82.654	83.768	84.877	85.983	87.085	88.184	89.278	90.369
400C											
	5	80.528	81.649	82.766	83.879	84.988	86.093	87.195	88.293	89.388	90.478
	6	80.641	81.761	82.877	83.990	85.099	86.204	87.305	88.403	89.497	90.587
	7	80.753	81.873	82.989	84.101	85.209	86.314	87.415	88.512	89.606	90.696
	8	80.865	81.984	83.100	84.212	85.320	86.424	87.525	88.622	89.715	90.805
	9	80.977	82.096	83.211	84.323	85.431	86.535	87.635	88.731	89.824	90.913

	C	500	510	520	530	540	550	560	570	580	590
	0	91.022	92.107	93.188	94.265	95.339	96.409	97.475	98.538	99.596	100.651
	1	91.131	92.215	93.296	94.373	95.446	96.516	97.582	98.644	99.702	100.757
	2	91.239	92.323	93.404	94.481	95.553	96.623	97.688	98.750	99.808	100.862
	3	91.348	92.432	93.512	94.588	95.661	96.729	97.794	98.856	99.913	100.967
	4	91.456	92.540	93.619	94.695	95.768	96.836	97.901	98.962	100.019	101.072
500C											
	5	91.565	92.648	93.727	94.803	95.875	96.943	98.007	99.068	100.124	101.177
	6	91.673	92.756	93.835	94.910	95.982	97.049	98.113	99.173	100.230	101.283
	7	91.782	92.864	93.943	95.017	96.089	97.156	98.219	99.279	100.335	101.388
	8	91.890	92.972	94.050	95.125	96.195	97.262	98.326	99.385	100.441	101.493
	9	91.999	93.080	94.158	95.232	96.302	97.369	98.432	99.491	100.546	101.598

TABLE VI - CELSIUS SCALE (Continued)
CLASS Q □□□□--B DETECTORS (32 OHMS AT 0C)
Temperature vs Resistance Values in Ohms at 1C Intervals

C	600	610	620	630	640	650
0	101.703	102.750	103.794	104.834	105.870	106.902
1	101.807	102.855	103.898	104.937	105.973	107.005
2	101.912	102.959	104.002	105.041	106.077	107.108
3	102.017	103.064	104.106	105.145	106.180	107.211
4	102.122	103.168	104.210	105.249	106.283	107.314
600C						
5	102.227	103.272	104.314	105.352	106.387	107.417
6	102.331	103.377	104.418	105.456	106.490	107.520
7	102.436	103.481	104.522	105.559	106.593	107.623
8	102.541	103.585	104.626	105.663	106.696	107.726
9	102.645	103.690	104.730	105.766	106.799	107.828

Product Warranty

Bailey Meter Company warrants the products manufactured by it to be free from defects in material and workmanship and will repair or replace, at its option, free of charge, f.o.b. its factory, such part or parts which prove defective within one year from date of shipment. In respect to any products which are not an integral part of a product manufactured by the Company, the warranty given by the manufacturer thereof shall apply.

Shipping Damage

We strongly recommend that you inspect and test your instrument as soon as you receive it. If the instrument is damaged or operates improperly, notify the carrier for inspection of the shipment. The carrier's claim agent will prepare a report of damage, a copy of which should be forwarded to your nearest Bailey District Office (see back cover for location). The District Office will then tell you how to have the instrument repaired or replaced.

Service

The Bailey Meter Company is vitally concerned that your Bailey instrument provides continued, fine performance. This instruction manual is designed to fully describe the correct installation, operation, and maintenance of your instrument under recommended conditions. If the need arises, factory-trained Service Engineers are on call for prompt, in-plant maintenance. Telephone or wire your nearby Bailey District Office to make arrangements for this service (see back cover for location and telephone number).

Replacement Parts and Supplies

Complete parts drawings and recommended spare parts kit information are included in this instruction manual. When replacement parts or supplies are required for maintenance of your Bailey instrument, contact your nearest Bailey District Office (see back cover for location). Always specify complete data on the instrument nameplate on your inquiry or order for parts. Common parts are available for shipment within 48 hours on a speed-order basis.

BAILEY METER COMPANY DISTRICT OFFICES, U.S.A.

CALIFORNIA

San Francisco
Code 415 Phone 989-6140

Los Angeles
Code 213 Phone 283-1187

COLORADO

Denver
Code 303 Phone 757-5408

GEORGIA

Atlanta
Code 404 Phone 378-4348

ILLINOIS

Chicago
Code 312 Phone 427-7324

LOUISIANA

New Orleans
Code 504 Phone 488-0841

MASSACHUSSETS

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Code 617 Phone 426-0465

MICHIGAN

Detroit
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St. Paul
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Code 314 Phone 962-5532

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Code 518 Phone 374-7991

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